

Contractors and Engineers Monthly

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Highlights Of This Issue

North Dakota Grading

A 13.5-mile grading and surfacing contract south of Minot, N. D., was completed last summer in a program to close unpaved gaps in the state highway system. See page 2.

Natural Cement Used in Vt.

On current concrete paving jobs on Vermont state highways, one bag of natural cement is used for each five bags of portland cement in a six-bag mix. One such job for 2,064 miles of paving near Rutland is described in this issue. See page 2.

Cutting Batch Hauling Costs

For the profitable prosecution of a job, a highway paving contractor finds two factors of extreme importance: first, the determination of unit hauling costs for estimating purposes; and second, the operation of hauling equipment to minimize hauling costs. William P. Blanchette of the Public Roads Administration provides a formula for the first and many helpful suggestions for the second in an article no highway paving contractor should miss. See page 9.

Eliminating Frost Boils

The problem of frost boils has long been a serious one for highway engineers. That they are caused by inadequate subsurface drainage has been established beyond all possible doubt whatever. So to eliminate frost boils and correct weak subgrade conditions on its old roads, Connecticut is carrying on a \$200,000 program for the installation of drainage pipe where required. See page 17.

Maintaining County Roads

In another of our series of interviews with county highway engineers, the problems of road maintenance and snow removal and the equipment and organization for carrying on that work in Polk County, Iowa, are described. See page 43.

SEPULVEDA DAM

Elevating Grader and Pile Drivers Used on 3-Mile Flood-Control Project

Earth-Fill Structure Is Part of U.S.E.D. Program To Protect Los Angeles And Environs from Flood

By OWEN H. BARNHILL

(Photos on page 44)

THE rapid, satisfactory and profitable progress made in the construction of Sepulveda Dam on the Los Angeles River in southern California provides a valuable object lesson, that of the advantage of using equipment best adapted to the work at hand. The contractors, Jahn, Bressi & Bevanda et al of Los Angeles, wisely avoided the mistake of using whatever machines they happened to have, regardless of job requirements. Instead they did not hesitate to buy new equipment of a type different from that being used generally in that region, though successfully employed elsewhere, and to revive an excavation method discarded in California more than a dozen years ago.

The result of following this sound but



Pile drivers placing H-type sheet piling for the cut-off wall beneath the spillway ogee at Sepulveda Dam.

unusual policy is profitable progress on a contract taken for \$168,263 less than the lowest competitive bid and \$813,000 below the highest bid. The winning low bid of \$3,121,267 was \$579,000 or 13.3 per cent below the government estimate. The estimated additional expense for superintendence, materials and other items, amounting to \$637,000, will bring the structure's total cost to \$3,758,000, exclusive of extras not figured in the contract.

Sepulveda Dam is part of the \$70,000,000 flood-control program being carried out in Los Angeles and Orange Counties by the U. S. Engineer Department, which designed the dam and is supervising its construction. The project.

(Continued on page 10)

SCENES ON ROAD WORK DESCRIBED IN THIS ISSUE



C. & E. M. Photo
A 2,064-mile concrete pavement on U. S. 4 in Vermont was cured with Socony cut-back. See page 2.

Work on California Dam Included Driving Piles For Spillway Support; Subbed to Tavares Co.

IN addition to rapid dirt moving, the contractor for Sepulveda Dam on the Los Angeles River in southern California was confronted with the biggest pile-driving job ever attempted in that section of the country, sinking 4,600 steel piles up to 58 feet in depth at the site of the spillway. There were 2,898 12-inch H bearing piles 12 inches square and 45 to 60 feet long, weighing 53 pounds per foot, and 1,382 Z piles 25 to 60 feet long, weighing 32 pounds per square foot. A total of 5,713 tons of U. S. Steel piling was driven in record time.

H-type bearing piles were used because they possess a maximum of friction surface, while Z-type sheet piles were used for the cut-off walls. The latter, which also supply some bearing power, form a wall underneath the spillway.

(Concluded on page 37)



One of the major road problems of Polk County, Iowa, is removal of snow from 681 miles of roads. See page 43.



Sheepfoot rollers compacting new grade on a 13.5-mile project in North Dakota, part of the Highway Department's program to surface its entire system. See page 2.



Connecticut has underway a \$800,000 program to eliminate subsurface water from its old roads by installing metal drainage pipe. See page 17.

IN THIS ISSUE

Batch Hauling Costs.....	9
Bituminous Paving.....	7
Bridge Construction.....	28
Canal Lining.....	14
Care of Equipment.....	32
Cartoon.....	4
Concrete Paving.....	2
County Road Work.....	2, 43
Dam Construction.....	1
Defense Roads.....	27
Editorial.....	4
Erosion Control.....	39
Federal Aid Funds.....	41
Grading.....	2
Highway Drainage.....	17
News Photos.....	22, 23
Pile Driving.....	1
Roadside Development.....	39
Roadside Development Awards.....	4
Sand and Gravel Plants.....	2
Traffic Striping.....	20

Balanced Cuts and Fills On North Dakota Grading Job

W. H. Noel Co. Builds 13.5 Miles of Grade in State's Program to Close Unpaved Gaps in Highway System

(Photo on page 1)

† AVERAGING 6,000 yards a day over a 13.5-mile grading project which was one long succession of 25 to 30-foot cuts and fills, the W. H. Noel Co. of Jamestown, N. D., completed the dirt grade for stabilized gravel base and bituminous surfacing on Trunk Highway 83 south of Minot, North Dakota, during the 1940 construction season. The project, including the black top which was applied by the Northwestern Engineering Co. of Rapid City, S. D., totaled almost \$200,000 and is typical of the work the North Dakota State Highway Department is doing to close unpaved gaps on main roads in the trunk highway system.

Hard hit by recurrent drouths and low market prices for its chief product, farm produce, citizens of the state have contributed diminishing tax receipts to the state coffers. The Highway Department has struggled along on a curtailed budget, striving to match Federal Aid funds, to meet Federal standards and to complete a roughly oblong system of hard-surfaced highways on the state trunk system, extending from north to south and east to west state borders and linking the state's key cities of Bismarck, Fargo, Grand Forks and Minot. These four of the state's trunk highways which have received initial attention provide two east-west and two north-south trans-state routes.

During the summer of 1938, Trunk Highway 10, extending the breadth of the southern part of the state from the largest city, Fargo, through the capital, Bismarck, to the Montana border, was completely hard surfaced. In 1939, Trunk Highway 81, running north and south in eastern North Dakota, was black-topped over the 90 miles that separate the capitals of the rich Red River valley, Fargo and Grand Forks. During the 1940 construction season work has been rushed towards completion of this oblong system of main trunk highways with the surfacing of unpaved gaps in Trunk Highway 2 extending through northern North Dakota from Grand Forks through Minot and Williston to the Montana border, and with reduction of the unpaved mileage on the north-south Trunk Highway 83 extending from the Canadian border through Minot and Bismarck to the South Dakota line. The

1940 construction season saw not only closing of the last unpaved gaps on Trunk Highway 2 in northern North Dakota, but a reduction in the unpaved mileage between Minot and Bismarck, a total distance of 119 miles, to only 37 miles.

The oblong formed by these four highways contains the state's richest farm land and its largest cities. With extensions to the borders and completion of hard surfacing on two additional north-south routes between Trunk Highways 2 and 10, one on Trunk Highway 85 in western North Dakota and the other extending north and south through Jamestown in the central part of the state, North Dakota will have a primary highway system providing dust-free travel for a maximum volume of traffic on a minimum number of miles.

Project on Highway 83

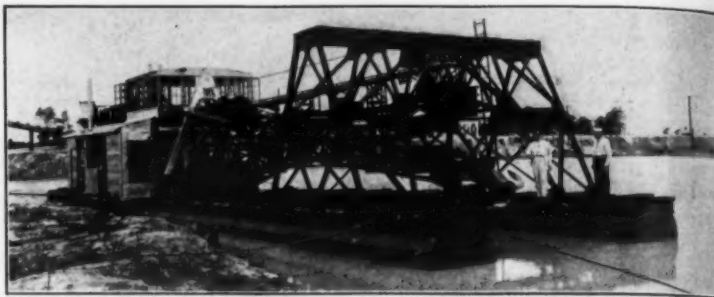
Typical of North Dakota Highway Department projects in the comprehensive program to provide hard-surfaced roads on all important state trunk highways were two contracts totaling almost \$200,000 awarded on April 12 for grading, stabilized gravel base and bituminous surfacing of 13.5 miles on Trunk Highway 83 between South Prairie, 13 miles south of Minot, and Max. The early spring letting drew a field of nine hard-hitting bidders on each project.

New Approach Paving For Rutland, Vermont

Troy Paving Co. Completes 2.064 Miles of a 20-foot Concrete Pavement, Using Natural Cement in Batch

(Photo on page 1)

† CURRENT concrete paving in Vermont calls for one bag of natural cement with five of portland cement for a 6-bag batch producing 1 cubic yard of concrete. The 2.064-mile contract of the Troy Paving Co., Inc. of Hudson Falls, N. Y., running from the Rutland city line northwest toward Mendon on U. S. 4 met this requirement. This project FAP 76-D (1) for a 20-foot pavement 7 inches uniform thickness and with some 24,000 cubic yards of excavation, including borrow, was awarded on the low bid of \$96,993.30. Work was started



The dredge used by Shelby County to deliver material to its screening and washing plant. Note the unique cutter head on the suction pipe.

The contract for the grading of FAP Nos. 86 (3) and 336 A (2) was awarded to the W. H. Noel Co., Jamestown, N. D., for \$106,064. The quantities and prices on this contract were:

Item	Quantity	Unit	Price	Total
Excavation	559,448 cu. yds.	\$0.158		\$77,500
Overhaul	179,509 cu. yds.	.015		2,692
Water for compaction	3,127 M gals.	.75		2,345
Obtention of old road	4,990 lin. ft.	.30		998
Traffic service gravel	9,443 cu. yds.	.75		7,082
Concrete monuments	6	5.00		30
Relaying pipe	412 lin. ft.	1.50		618
18-inch r. s. pipe culverts	700 lin. ft.	2.50		1,750
21-inch " " " "	2,434 lin. ft.	3.30		7,788
27-inch " " " "	86 lin. ft.	4.00		344
30-inch " " " "	118 lin. ft.	4.80		566
18-inch corrug. metal pipe culverts	922 lin. ft.	1.95		1,297
24-inch corrug. metal pipe culverts	152 lin. ft.	2.50		349
Culvert excavation	225 cu. yds.	1.90		428
Class "A" 1 1/2" concrete	68.3 cu. yds.	24.00		1,636
Reinforcing steel	10,570 lbs.	.06		634

Northwestern Engineering Co., Rapid City, S. D., was awarded the contract for the stabilized gravel base and bituminous surface treatment on its bid of \$84,340. Quantities and prices follow:

Item	Quantity	Unit	Price	Total
Beam guard rail	1,575 lin. ft.	\$1.35		\$2,126
Stabilized gravel base	60,023 tons	.87		52,220
Bitumen SC-2 for prime coat	100,720 gallons	.085		8,561
Bitumen RC-4 for tack coat	89,160 gallons	.095		8,470
Cover aggregate (Grade 2)	2,184 tons	2.35		5,132

Within one week after the contract (Concluded on page 16)

County Operates Own Gravel Plant

A Hydraulic Dredge and Screening-Washing Plant Supply Aggregate Needs to Shelby County, Tenn.

(Photo on page 44)

† ONE of the most modern sand and gravel plants under either private or public ownership in this country is located in Shelby County, Tenn., at the County Penal Farm, and produces 750 cubic yards of washed and screened sand and gravel in 10 hours. The plant was designed by the Link-Belt Co. and was placed in operation June 4, 1939.

Located on a levee well above high water, about 1/4-mile from the Wolf River, the plant is surrounded by an almost unlimited gravel deposit. An overburden of 10 to 15 feet of tillable river silt underlain by 6 feet of sand somewhat complicates the operation of this plant at present, but as the pit increases in area a conveyor system on pontoons, fed at the far bank by a dragline, will dispose of the overburden by dumping at the shore close to the plant, thus preventing the overloading of the washing equipment of the plant.

The Dredge

The dredge barge is a 24 x 42-foot steel scow with 65 feet of cylindrical pontoons forward on each side to support the bridge which carries the cutter head. This suction dredge, which was designed by P. Y. Isbell, a Shelby County official, has a unique adjustable cutter head with the drive shaft outside the suction pipe. The 10-inch cutter head is carried on a 47-foot boom and is driven at 11 rpm through a Link-Belt triple-reduction herringbone-gear speed reducer direct-connected to a 10-hp Westinghouse motor. The drive shaft of this cutter head has one babbit bearing above water; the remainder of the bearings, which are submerged most of the time, are of rubber.

The 440-volt 3-phase electric line is carried over the pontoons which support the dredge line. A set of reels inside the dredge housing permits lengthening the discharge line without the necessity of making new cable connections. The main pump is an American Manganese Steel unit, driven by a 300-hp Allis-Chalmers electric motor through a V-belt drive. A 3-inch Chicago centrifugal pump, driven by a 7 1/2-hp Westinghouse motor, furnishes the sealing water for the dredge pump to keep sand from the bearings.

The dredge has one operator and an assistant who alternate in operating the dredge on the single day shift. Mounted in the operating cabin are four drums, all driven by a 25-hp Westinghouse motor. One drum raises and lowers the cutter boom, two drums take care of the lateral movement of the barge and the other is used for backing. A novel feature of this dredge is the use of a 5 1/2-hp motor to run the cutter head

(Concluded on page 19)



This Cedar Rapids single-unit crushing and screening plant produced an average of 60 cubic yards of traffic service gravel an hour on the W. H. Noel Co.'s 13.5-mile grading project on Trunk Highway 83 south of Minot, North Dakota.

November 1, 1939, suspended from December 21, 1939, to April 1, 1940, and completed July 31, 1940.

Preliminary Work

On excavation and borrow, the contractor used his own Lorain 75B and a Lorain 75D hired for the work, loading to hired trucks. Several wet spots on the grade were excavated and backfilled with gravel to eliminate frost boils. The contract included 14,000 cubic yards of straight excavation, 10,000 yards of gravel as borrow for fill and 15,000 yards of gravel sub-base 12 inches thick over the entire contract.

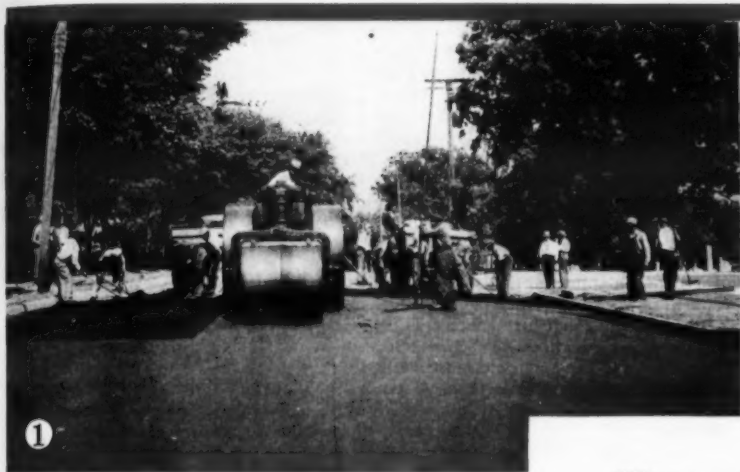
Several large stone retaining walls were built to protect property and one bank revetment of cement rubble masonry was laid for a distance of 135 feet along a stream and 12 feet high to protect the roadway from the severe erosion which has occurred at periods of high water. The stones in this wall are mostly between 1 and 3 cubic yards in volume, amounting to about 200 cubic yards in all. All of the rock was placed with a shovel, and the bottom of the wall, 8 feet thick, was composed of one stone. The wall is 18 inches thick at the top and battered 3 inches per foot on the face and 4 inches per foot on the road side.

Form Setting and Fine Grade

The form-setting crew consisted of one boss setter ahead with five to six men preparing the trench and handling the 7 x 7-inch forms and one setter behind with two men taking care of the final lining up. An Austin motor grader with solid tires worked between the forms, cutting the final grade, and in the gravel subgrade which was left slightly high. A grade foreman with seven men and

(Concluded on page 40)

A man who knows ASPHALT



1 Paving with Texaco Sheet Asphalt in Freeport, Ill.



2 Laying an Intermediate-type Texaco Asphalt road in Roscommon County, Mich.

3 Road-mix method of constructing low-cost Texaco Asphalt road in Colorado.

4 Applying a heavy Texaco Asphalt Surfacing Material to Connecticut highway.

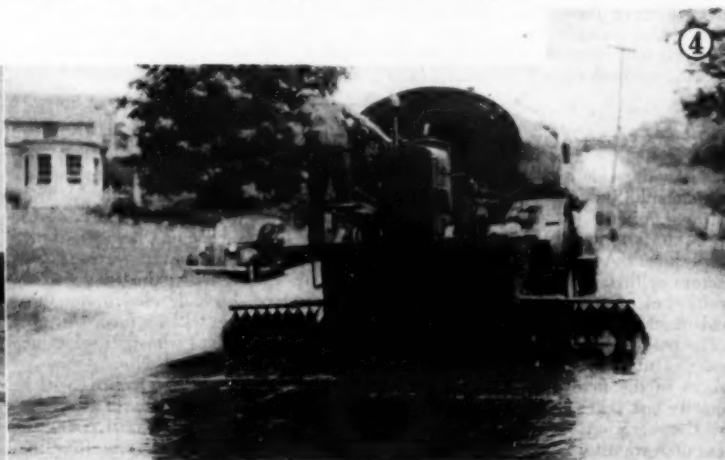
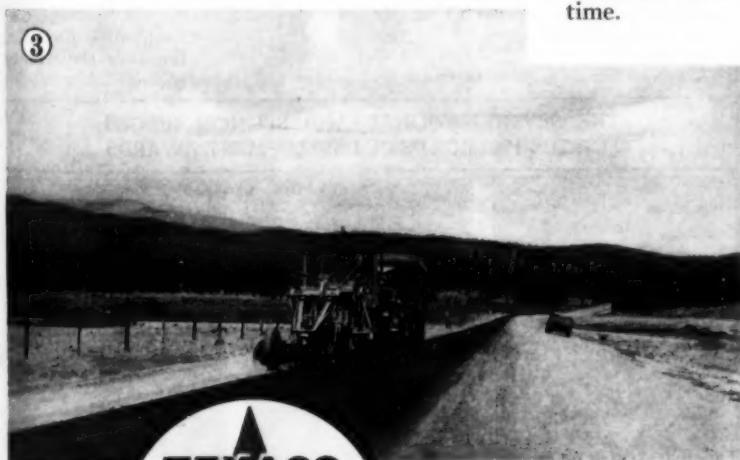
When you discuss a road or street problem with a Texaco Asphalt representative, you are talking to a specialist.

This man devotes 100% of his time and his thought to Asphalt.

Consequently he knows Asphalt thoroughly. He understands the special characteristics of every grade, its particular merits and the use for which it is peculiarly fitted.

Texaco Asphalt representatives, who contact road builders in every State east of the Rockies, have averaged approximately 17 years at their jobs; many of them from 20 to 30 years.

For sound, dependable assistance in solving a road or street problem, call in a Texaco Asphalt representative every time.



TEXACO ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City
Chicago Kansas City Houston Jacksonville Philadelphia Richmond Boston

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Why Do They Drive That Way?

In the wanderings of an Editor in the field, he has plenty of opportunity to observe the way other folks drive, and has come to the conclusion that the greatest menace to safety on the highway is the "Straddler." We are here and now starting a campaign to get men and women drivers to stay in the lane in which they are supposed to be driving and NOT to straddle two lanes by riding the dividing line continuously.

When New Jersey started the divided highway on U. S. Route 1 by pushing the slab over a few feet, we went down there to see the performance and also to get a line on why it was necessary. We interviewed a motorcycle policeman whom we met on the road and asked him why there were so many accidents on a straight wide road with two 10-foot lanes in each direction. His reply was illuminating.

With the right-hand lane of a two-lane highway occupied by a car or a truck traveling about 35 miles an hour, someone coming up behind decided that he wanted to go faster so he would start to move out into the second right-hand lane to pass at 50 miles an hour, which is 10 miles faster than the state law permits. Then a third driver coming up behind him thought that 50 miles an hour was just crawling along and could not wait until the second right-hand lane

was clear, so he would cut out into the first opposing lane to go around the two vehicles just as someone from the far opposing lane decided to pass the car ahead. The inevitable result was a head-on collision.

New Jersey and many other states have solved this problem by the divided highway, where the driver in too great a hurry can not get in the way of traffic traveling in the opposite direction. Therefore many accidents have been prevented by highway design. But what are we going to do with the Straddler who insists on riding over the line all the time on a two or three-lane highway, thus forcing all traffic which would pass him to go over into the third lane? He is inevitably a slow driver, we have noted, so that almost everyone on the road, including trucks, passes him. And right here we might mention that the truck driver of the large vehicle with dual rear wheels is a frequent Straddler. Whether he realizes or not, his rear tires all too often carry over into the next lane, forcing traffic over into the third lane in order to pass him.

We ask the AAA, truck associations, state police, gasoline companies and safety organizations who pass out various kinds of safe driving signs and literature to enlist in this move to eliminate Straddlers from the road.

Judges for Roadside Development Awards

It is with pride and pleasure that we announce the judges for the Section and National Awards in the 1940 CONTRACTORS AND ENGINEERS MONTHLY Roadside Development Awards for highway contractors or their superintendents, in recognition of outstanding contributions to roadside development during 1940.

The board of National Judges will be made up of the same three outstanding figures in the field who served in that capacity last year: H. H. Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture; Roy W. Crum, Director, Highway Research Board, National Research Council; and Charles M. Upham, Engineer-Director, American Road Builders' Association.

The judges for the four Section Awards will be W. Vance Baise, North Carolina State Highway Engineer, assisted by F. H. Brant, Landscape Engineer for the North Carolina State Highway and Public Works Commission; Gen. Robert S. Beightler, Director of the Ohio Department of Highways, assisted by Dallas D. Dupre, Jr., Ohio Landscape Architect; William J. Cox, Commissioner, Connecticut Department of Highways, assisted by John L. Wright, Director of Roadside Development; and C. H. Purcell, California State Highway Engineer, assisted by H. Dana Bowers, Landscape Engineer for the California Division of Highways.

The 1940 competition closes on November 1.

At that time the nominations, which are made by the state highway departments, will be turned over to the Section Judges, each of whom will judge the nominations from a section other than his own. When the four Section Awards have been decided upon, these four nominations will be turned over to the National Judges who will select one as the National Award winner.

Announcement of the Awards will be made in the January issue of CONTRACTORS AND ENGINEERS MONTHLY, and the Awards themselves consist of four mahogany plaques bearing a suitably inscribed silver plate, for the four Section Award winners, and a sterling silver loving cup as the National Award.

SECTION JUDGES



W. Vance Baise, State Highway Engineer of North Carolina.



Gen. Robert S. Beightler, Ohio Director of Highways.



John Haley Photo W. J. Cox, Connecticut Highway Commissioner.



C. H. Purcell, State Highway Engineer of California.

Engineers Discuss Use of Subgrade Felt

To the Editor

CONTRACTORS AND ENGINEERS MONTHLY

We have reviewed your article relating to the use of subgrade felt which appeared in the September issue of your magazine.

Since 1937 this Department has not used subgrade paper in the construction of concrete pavements, although up to that time we had specified this type of construction on all concrete pavement work. However, after the general inception of the theory of moisture-controlled embankment, we abandoned the use of subgrade felt and now specify only that the subgrade be treated with water to attain a certain moisture content and density in relation to the Proctor compaction curve.

Our present specification for the subgrade for concrete pavement stipulates that the 6 inches of soil immediately below the concrete pavement be wet or dried in such a manner that the moisture content is within three percentage points of the optimum moisture content as determined by modified Proctor tests. The density of the subgrade must attain a value which is not less than 90 per cent of the maximum density attained by this test.

Very truly yours,
George F. Swatek,
Materials Engineer,
Nebraska Department
of Roads and Irrigation.

To the Editor

CONTRACTORS AND ENGINEERS MONTHLY

We have not gone into a wide practice with subgrade felt but we have made some use of it in northeastern Ohio. Your article on this subject in your September issue describes very closely the limited practice in Ohio. We have found it to be of special value on those sandy soils where the water was too readily absorbed. As you may know, we have a wide variety of soils in Ohio and in the more impervious clays it would be more difficult to justify the use of subgrade felt, but along the lake and in general the northwestern part of the state there is a decided field for this treatment.

The specifications used in Ohio are



"MUST those American contractors test subsoils to this extent?"

substantially the same as those quoted in your article. We have not gone into this practice generally on account of expense but we are interested and feel that the proposition deserves further study and experimentation.

Yours very truly,
T. W. Kinnear,
Chief Engineer,
Bureau of Construction,
Ohio Department of Highways.

To the Editor

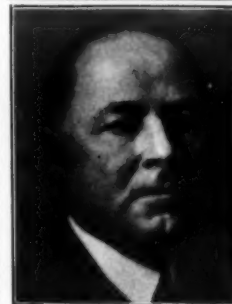
CONTRACTORS AND ENGINEERS MONTHLY

Tennessee has constructed only three or four projects using a waterproof membrane between the subgrade and the concrete pavement. The policy of this Department is to specify the subgrade treatment in certain localities where subgrade conditions warrant the use of this membrane. The last project in which subgrade paper was specified showed the use of this paper as an alternate, leaving its use to the discretion of the contractor.

I might further state that our experience has been that, on projects where profile grades are from 4 to 6 per cent, the contractor has had difficulty in finishing the pavement at the expansion joints where subgrade felt was used. After the pavement was poured and finished, the concrete had a tendency to crawl and build up against the expansion joints, necessitating the refinishing of the pavement at the joint.

Yours very truly,
O. F. Goetz,
Construction Engineer,
Tennessee Department
of Highways and Public Works.

THE SEVEN NATIONAL AND SECTION JUDGES FOR THE 1940 ROADSIDE DEVELOPMENT AWARDS



H. H. Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture.



Charles M. Upham, Engineer-Director, American Road Builders' Association.



Harris & Ewing Photo Roy W. Crum, Director, Highway Research Board.

New Bulletins Describe

Snow Removal Equipment

The Caterpillar Tractor Co., Peoria, Ill., has available a series of bulletins on its line of snow removal equipment. This consists of snow plows and mast-type snow wings for mounting on Caterpillar motor graders or on diesel tractors ranging from the D2 for sidewalk work to the big, drift-clearing D8, diesel motor graders, rotary plows and loaders. An outstanding feature of the Cater-

pillar diesel, according to the manufacturer, is its ease of starting in winter. The small gasoline starting engine that cranks the diesel will not run down or require recharging.

Copies of these bulletins may be obtained direct from the manufacturer.

Portable Service Stations

A typical set-up of Alemite lubrication equipment for use in the field consists of two heavy-duty volume grease

guns, one high and one low pressure, a motor oil pump, hose assemblies, hose reels, drum holders and air regulator, mounted on either a truck or trailer. This supplies power lubrication on the job when needed, saving time and preventing breakdowns.

The Alemite Div., Stewart-Warner Corp., 1850 Diversey Parkway, Chicago, Ill., has recently issued a catalog setting forth the advantages of this portable service station, describing the equipment included and suggesting various set-ups.

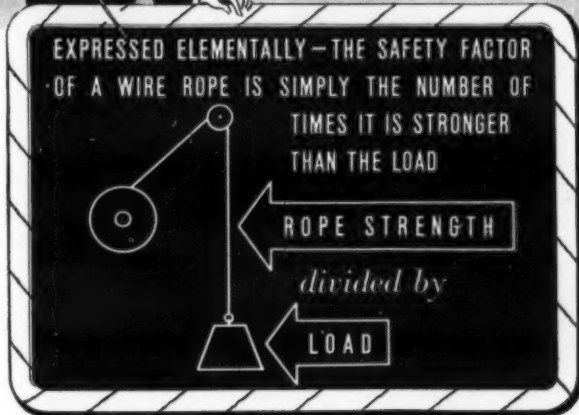
Copies may be obtained by those interested direct from the manufacturer.

New Chain Belt Dealer

The Chain Belt Co., Milwaukee, Wis., has announced the appointment of the Hawkins Equipment Co., 1475 Thomas St., Memphis, Tenn., as its exclusive distributor of Rex construction equipment in the Memphis area, to handle the Rex line of pavers, mixers, centrifugal Moto-Mixers and Pumpcretes.

Of course

YOU KNOW HOW TO FIGURE FACTOR OF SAFETY



As a user of wire rope, you want to get as much service as possible from your wire rope—and, at the same time, guard against premature failure, accidents, production delays. In other words, you're concerned about wire rope safety factor.

We would like to be able to say, "Just take your dead load and multiply it by such and such a safety factor—and, presto! that's the rope strength you need". But, unfortunately, it's not quite as simple as that.

From our experience of many years in the wire rope business, we know that in order to determine Adequate Safety for a specific wire rope installation, it is necessary to take into

consideration not only dead load but also all other possible load stresses, such as those created by the factors listed to the right. In addition, allowance must be made for other factors, such as the degree of protection desired against production delays and accidents.

Wire rope specifications, carefully worked out on this basis for individual installations, pay many times over in longer rope life and increased rope safety. We would welcome an opportunity to cooperate with you toward this end.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. Branches in Principal Cities

This advertisement is published in the interest of all wire rope users, to help them obtain greater safety, service and efficiency from their wire rope.

ROEBLING

Wire Rope



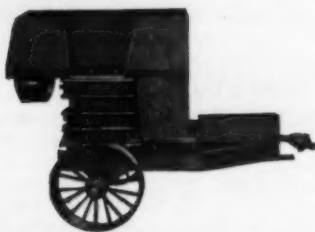
But—

Adequate Safety for a specific installation can be determined only by considering all these Vital Factors:—

- ✓ ACCELERATION
- ✓ DECELERATION
- ✓ LENGTH OF ROPE
- ✓ SPEED
- ✓ ATTACHMENTS
- ✓ REEVEING CONDITIONS
- ✓ DRUM CONDITIONS
- ✓ CORROSION
- ✓ ABRASION
- ✓ PROTECTION AGAINST PRODUCTION DELAYS AND ACCIDENTS
- ✓✓ CONSTRUCTION AND QUALITY OF WIRE ROPE

Therefore For longer, safer wire rope service consult the nearest Roebbling office, giving all pertinent data on your installations.

Ask about ROEBLING "BLUE CENTER" WIRE ROPE... either standard or preformed



The new Diamond portable crusher.

Portable Crusher For Highway Jobs

A new portable rock crusher which has a wide range of uses in highway construction and maintenance has been announced recently by the Diamond Iron Works, Inc., Minneapolis, Minn. This unit is designed for fast portability to break down rock or gravel excavated during grading so that the crushed material can be rolled right back onto the road instead of being stacked along the roadside or trucked away. It will travel into any roadside pit where a tractor can go.

The unit consists of a Diamond roller-bearing crusher mounted on a structural steel frame, electric welded throughout, with steel wheels as standard equipment and solid or pneumatic-tired wheels at slight extra cost. The Universal joint drive shaft, mounted in anti-friction bearings, and the V-belt drive to the crusher are enclosed for safety and protection against dust and dirt. The crusher is powered from the rear power take-off of any tractor through a flexible joint drive shaft and V belts, and will operate for crushing scattered stones while the unit is moving along the road.

Further information on this Diamond crusher-trailer, which is available in crusher sizes of 9 x 18, 10 x 20, 9 x 24 or 10 x 24, is contained in Bulletin D-40-J, copies of which may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

NEW!



Pneumatic SKILSAW

THE most famous portable circular saw is now made available for operation by air . . . with all the time-and-cost-cutting features that have made SKILSAW the leader in its field. Will rip and cross-cut timbers up to 4 in. full and bevel-cut lumber 3 5/16 in. thick at 45°. Ideal for cutting terra-cotta and other building tiles.

- Special governor regulates speed and reduces air consumption.
- Poppet-type throttle valve is leak-proof; cuts off air the instant it's closed.
- Positive safety lock on throttle prevents all accidental starting.
- Automatic telescoping guard, mounted on ball bearings, shields saw blade when not cutting.
- Blade diameter 12 in.; free speed 1200 R.P.M.

SKILSAW, INC.

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36 East 22nd St., New York • 193 Main St., Boston • 25 Brookline Ave., Boston • 15 E. 51st St., Philadelphia • 2003 Euclid Ave., Cleveland • 2124 Main St., Seattle • 516 Union Street, Los Angeles • 1555 South Flower Street, New Orleans • 1033 Webster Street, Oakland • 210 North Avenue, N.W., Atlanta • Canadian Branch: 85 Delaware Ave., Toronto.

Asphalt Conference Will Stress Defense Program

Sponsored by The Asphalt Institute, with the Public Roads Administration, the Highway Research Board, the Association of Asphalt Paving Technologists and the Texas State Highway Department cooperating, the Thirteenth National Asphalt Conference will be held at Dallas, Texas, during the week of December 9, 1940. It is expected that some 2,000 engineers, technologists, contractors and representatives of the petroleum industry will attend.

Because of the widespread use of asphalt in airport construction in addition to its major use on highways and streets, the Conference will stress the subject of airports and highways in the national defense program. Col. Patrick J. Hurley, ex-Secretary of War, will deliver the keynote address on national defense and Thomas H. MacDonald, Commissioner of Public Roads, is expected to discuss highway problems in their relation to national defense. The

Texas State Highway Department, as host, will show the delegates Texas' many miles of asphalt surfacing of all types.

Other subjects will be the function of asphalt in preventing the erosion of river banks and lake shores and in lining of canals and ditches, and the potential improvement in railway road beds through the use of asphalt ballast.

Booklet on Ice Control

An instructive pocket-size booklet entitled "How to Make Icy Roads Safer With Dowflake" has been issued by Dow Chemical Co., Midland, Mich., in an effort to assist those responsible for ice-control programs in their selection of the most effective materials. Such subjects as the value of treating abrasives, preparation of stockpiles and the skid resistance of Dowflake-treated abrasives are fully covered.

Those interested may obtain a copy of this booklet by writing direct to the manufacturer and mentioning this item.

Portable Concrete Plant

The Strayer portable concrete plant is described and construction features are effectively illustrated in Bulletin SCP 3-40 recently issued by the Erie Steel Construction Co., Erie, Penna. According to the manufacturer, this unit is a big production plant which can be used for large or small yardage jobs. Among its features are its one-man control, exclusive of cement handling; it makes low-cost concrete on the job to any specifications; it can move onto the job, pour concrete in less than one hour and can be made ready for travel to the next job in 30 minutes, meeting highway clearance regulations. It is available in three sizes, 1/2 yard, 3/4 yard and 1 yard.

Copies of this bulletin, which also contains illustrations showing the type of concrete work this concrete plant was used for on the Pennsylvania Turnpike, may be obtained direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

TACONITE MEANS Tough Digging IN ANY MAN'S LANGUAGE

Any dipper that can stand up under digging conditions found here can claim title to maximum strength and ruggedness. The PMCO fabricated dipper has successfully stood the test.



• The extreme hardness of this taconite presents a condition that requires the strongest type of dipper.



PMCO

THIS PMCO 4 1/4 yard dipper has been in use in this hard taconite for over a year and has stood the test. Reinforced welded construction provides unusual strength to stand the terrific torsion strain when a corner tooth hooks under a hard piece of taconite.

The PMCO dipper costs the same as a solid cast dipper, but the advantages in increased capacity and strength are so outstanding that every shovel user should know the whole inside story of this sensational new type of dipper. Consult your shovel manufacturer or write us.

• Here is the dipper that does the work. This 4 1/4 yard PMCO dipper, without teeth in place, shows the sturdy construction with reinforcing sections welded into a unit of unusual strength but with elimination of unnecessary weight.

Consult your shovel manufacturer about the increased profit possibilities of the PMCO dipper.

• The wide lip on this 4 1/4 yard dipper gives a full load at every pass. Speed of operation is of utmost importance on this shovel that is operating continuously with three 8-hour shifts.

• Teeth marks in this bank show the hardness of iron ore in this mine. Standing directly above the dipper when it bites into this ore you can feel the vibration of the impact throughout the surrounding bank.

WRITE FOR
BULLETIN
D100

for the complete story of this new type dipper that is being accepted with such favor by shovel men everywhere.

PETTIBONE MULLIKEN CORPORATION

Established 1880

4710 West Division Street, Chicago, Illinois

New M-I-P Surface On Regraded Highway

Increased Use of Va. 7 by Commuting Traffic Made It Necessary to Widen and Reconstruct During 1940

+ WITH traffic counts running to 240 vehicles per hour during daylight hours and up to 348 an hour on Sunday afternoons, Virginia Route 7, which serves as a direct artery between Washington, D.C., and Leesburg and Winchester, Va., and the popular valley route, U.S. 11, the Virginia Department of Highways awarded a contract to Blackwell Engineering & Construction Co. of Warrenton, Va., for 2.9 miles of regrading and the placing of a new waterbound-macadam base and mixed-in-place surface.

For about 600 feet the existing 20-foot waterbound-macadam base which had been surface treated was widened 5 feet on each side and a 12-inch waterbound-macadam base placed in the trenches. For the balance of the contract a 30-foot waterbound-macadam base of slag 12 inches thick at the edges and 7 inches at the center was laid with 7-foot shoulders and the standard 2-foot ditch. This was surfaced with 1-inch mixed-in-place trap rock from 3/4-inch screen size down to dust.

Rough Grading

The rough grading on this contract was devoted to improving the old grade, particularly at vertical curves. A bad dip was removed by raising the grade approximately 12 feet at one point. All earth slopes were redressed to 1 to 1 with a roll at the top with a 6-foot radius. In order to take out bad subgrade conditions, numerous French drains were laid, some at 45 degrees across the road and others straight across where the grade was flat.

The rough grading equipment included one Bucyrus-Erie 1 1/2-yard gas-air shovel and a Bucyrus-Erie 10-B shovel loading to three International, one Ford and four Dodge trucks owned by the contractor, and to two hired trucks. An Allis-Chalmers LO tractor with a Drott bulldozer and a Caterpillar D7 with a bulldozer were used for roughing in the grade, followed up by a No. 10 Auto Patrol. This latter machine was used to cut the ditches and back slopes and the 10-B shovel was used on the ditches. The subgrade was finished accurately to a slope of 5/16 inch per foot from the center line of the highway to the shoulders.

A subgrade treatment of 6 inches of bank-run gravel was placed over about two-thirds of the project, being spread with the bulldozers and shaped with the grader to the same slope from the center line as the subgrade and then rolled with a 10-ton Buffalo-Springfield roller. The cost of the subgrade treatment was not included in the contract price of \$93,410.00 but was done on a Public Roads Administration work order as an extra.

The Waterbound-Macadam Base

Slag was used as the aggregate for the 12-7-12-inch waterbound-macadam base course which was spread in two equal courses. The slag was hauled from docks at Alexandria, Va., 8 miles distant, using a fleet of twenty trucks including the contractor's eight trucks mentioned above and twelve hired trucks. This fleet was able to haul sufficient slag so that 2,500 feet of base course, one-half the width of the road and one-half the total depth, was spread in a working day. The No. 0 slag used is from 3 1/2-inch down to 3/4-inch screen size. It was dumped from the tail-gates of the trucks at moderate speed for one-half the width

of the road for measured distances, according to the capacity of the truck. The slag was then hand-spotted with stone forks and rakes. The half layer was then rolled with the 10-ton Buffalo-Springfield roller and a 10-ton Galion power roller. Each layer of the slag base was filled with slag dust dumped from the tail-gates of trucks and hand-broomed. The dust was applied dry, thoroughly choked and then waterbound by wetting from tank trucks with sprinkler bars attached at the rear.

The first of the bituminous operation was priming the base with RT-5 tar under a subcontract awarded to Sam E. Finley of Atlanta, Ga. Finley used his own distributors, applying the tar at from 110 to 135 degrees F. and allowing it to remain on the road for 48 hours

minimum and actually up to 5 weeks before the mixed-in-place surface was started. The tar prime was applied at the rate of 0.4 to 0.5 gallons per square yard on new base and at 0.3 gallons per square yard on old base.

The Mixed-In-Place Top

Because of the large amount of traffic which normally uses this road it was not closed for the full width at any time. Traffic was maintained on half the road during a part of the time and over the entire width for most of the time, except immediately following the application of the prime or the asphalt for the mixed-in-place top.

As the prime had been on the road and used as a surface for upwards of 4 weeks over practically the entire length of the job before the mixed-in-place surface was applied, it was necessary to clean it thoroughly with shovels to take off cakes of clay and dust, followed by hand brooms and then finally with a power broom to remove thoroughly all dirt and dust from the surface. The trap

rock aggregate for the M-I-P treatment from 3/4-inch to 10-mesh was applied as a 50 to 70-pound per square yard treatment. (Concluded on page 31)

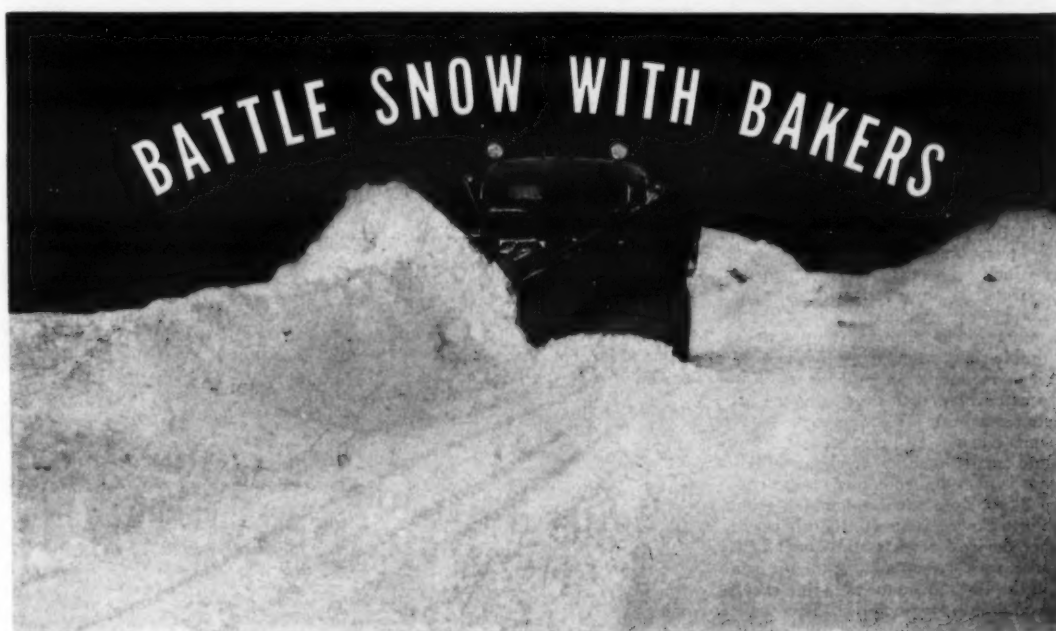
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ST. LOUIS, MO.



Superior equipment is essential to win wars. Snow removal from streets and highways presents a tough battle unless you use sturdy, dependable plows.

Baker Snow Plows are built to conquer Old Man Winter's worst blitzkriegs year after year, quickly and efficiently. They are the result of 32 years of experience in building snow plows to meet every need.

Twenty-one models of truck snow plows to select from, including those with sectional tripping blades, originated by Baker. One-way plows that really throw off the snow. Sleek, stream-lined "V" plows in a new series, built for any motor truck. New hydraulic plow lifts that are easier to mount on your trucks. It will pay you to investigate the advantages of Bakers.

THE BAKER MANUFACTURING CO.
585 Stanford Ave. Springfield, Illinois

America's Oldest Builder of Snow Plows for Streets and Highways

SNOW PLOWS—BULLDOZERS—GRADEBUILDERS—SCRAPERS—DISCS—MAINTAINERS



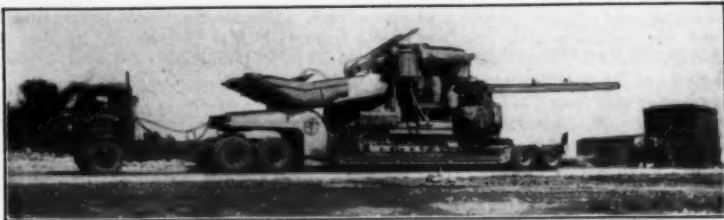
Baker also builds snow plows for large and small tractors of many makes in "V" and blade types, including side-walk plows of new design. Give names and models of tractors you have available for snow removal.

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CATALOG

Attractive new catalog No. 829 completely describing Baker Snow Plows for motor trucks will be sent on request. Also ask for bulletin on Tractor Snow Plows



BAKER SNOW PLOWS



A Rogers trailer transporting a MultiFoots 27-E paver from job to job. The weight of this load is 44,000 pounds.

New Attachment for Porto-Power Units

Among the new developments in the line of Porto-Power hydraulic equipment made by the Blackhawk Mfg. Co., Milwaukee, Wis., for pushing, pulling, clamping, pressing, bending and spreading operations is the Spec-D-Coupler.

Previously the 10-ton Porto-Power pump; ram and hose hydraulic units with attachments has been widely used by equipment maintenance men for the general run of work. However, this unit did not fully cover the range of jobs in garages, contractors' shops and maintenance depots. Although smaller-size and more powerful rams have been available, it was always necessary to purchase a pump and hose for each ram. The Spec-D-Coupler now makes it possible to connect the same pump and hose to any one of the Porto-Power rams, in the 4, 7, 10, 20 or 50-ton capacity. This coupler, which joins the high-pressure hose to the ram, seals an oil channel which transmits 10,000 pounds per square inch oil pressure; yet it can be disconnected or connected with a finger twirl.

Another Porto-Power development is a "thimble-size" 4-ton ram which is only 1½ inch in height and diameter. This ram was developed to exert pressure in remote assemblies where large-size tools or hands can not be inserted. It can be fed into small openings or channels because it is operated remotely on the end of an 8-foot hose when assembled with the Porto-Power. In addition there is another device known as the Duck Bill spreader which adapts the plunger action of the 10-ton ram to spreading sheet metal and other assemblies. This unit has jaws which spread from 1½ to 6 inches.

Literature on these new developments in the Porto-Power line are described in Catalog No. M40, copies of which may be secured direct from the Blackhawk Mfg. Co., Milwaukee, Wis., by mentioning this item.

New Stopping Hammer

A new 116-pound "balanced for easy handling" Stopehamer with automatic rotation has been announced by the Ingersoll-Rand Co., 11 Broadway, New York City. The center of gravity of this Stopehamer, known as the R-58, is such that the machine assumes a natural drilling position when it is picked up, which facilitates raising the machine to any operating position.

Other ease-of-handling features include a feed-leg control which permits many fine variations in feeding power; short overall height of only 59 inches which prevents the drill from being top heavy; a plate-type throttle valve to

provide half-throttle position for collaring holes; and the location of the exhaust on the opposite side of the cylinder from the operating controls. An automatic chuck cleaning system keeps the drill free from cuttings and water and at the same time provides ample lubrication for all fronthead-bearing surfaces.

An 8-page illustrated booklet, including a disassembled view of the R-58 Stopehamer, may be secured by those interested direct from the manufacturer by mentioning this item.

New Type Earth Drill Used in Peace or War

The latest model of the Buda-Hubron earth drill, made by The Buda Co., Harvey, Ill., is being purchased by the U. S. Army for such emergency activity as pre-boring for piling work to hasten the construction of temporary bridges and roads, for drilling holes underneath roads, bridge foundations and railroads preparatory to placing explosives, anti-tank traps or land mines.

Not all the services of this earth drill are for war. This type of drill has been in use in the construction industry for some time for exploratory drilling in foundation work, for digging post holes, and for soil testing. These drills are able to dig, in ordinary soil and soft rock, a 20-inch diameter hole 6 feet deep in 3 minutes and a 20-foot deep hole in 20 minutes, according to the manufacturer. They can drill holes from 12 to 42 inches in diameter and up to 24 feet in depth, while special

machines are capable of drilling holes up to 50 feet in depth. They can drill at an angle of from 15 degrees fore or aft of the truck platform and sideways either right or left to an angle of 45 degrees.

The particular model being purchased by the Army is powered by a 4-cylinder 40-hp water-cooled engine and is mounted on an automobile chassis.

New Hobart Trade School

Officials of the newly incorporated Hobart Trade School, Inc., operated by Hobart Brothers Co., Troy, Ohio, have announced the erection of a new trade school building. It is a two-story structure with a frontage of 90 feet and a depth of 60 feet and is constructed of all-welded steel. This new school, which will be ready for occupancy this autumn, will provide complete training in machine shop practice, electric arc welding and along other industrial and mechanical lines.



Not a Hurricane — Just a WALTER SNOW FIGHTER minding its business

WHEN you mount a Walter snow plow on a Walter truck that combines in one unit the powerful Walter Motor, Automatic Lock Differentials, Suspended Double Reduction Drive, and Heavy-Duty Tractor Type Transmission, you have a snow fighter that can strike with all the force of an avalanche.

The extraordinary traction afforded by the Walter features just mentioned makes all of the great power of the engine available at all times. That is why WALTER SNOW FIGHTERS have such enormous working capacity in heavy snowdrifts. Communities subject to heavy snowfall are replacing other units fast with the dependable WALTER SNOW FIGHTER. Even where winters are comparatively mild Walter Trucks are kept ready for the occasional blizzard. Make your community safe for many winters to come by ordering at least one WALTER SNOW FIGHTER now. Send for literature.

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RIDGEWOOD, QUEENS, L. I. N. Y.
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Insist on this guarantee when next ordering dewatering equipment.

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Cutting Costs of Hauling For Highway Paving Jobs

Careful Study of Needs,
Well-Planned Batching
Plants, and Equipment
in Repair Add to Profit

By WILLIAM A. BLANCHETTE,
Highway Engineer, Public Roads
Administration

(Photos on page 44)

† TWO of the factors which concern the highway paving contractor in connection with his hauling costs are, first, the predetermination of unit hauling costs for estimating purposes and, second, the operation of the hauling equipment on the project to result in the lowest possible hauling costs consistent with efficient general construction operations.

The hauling operation connected with highway paving usually consists of transporting the major paving materials from a central plant on the project to the points where these materials are incorporated in the work. The job may consist of constructing a portland-cement concrete pavement involving the batch hauling of cement and aggregates, or the hauling of the mixed concrete, or it may consist of constructing a pavement composed of aggregates and bitumen, involving either the batch hauling of the premixed materials or the bulk hauling of the separate materials.

Hauling of this nature is usually done with trucks ranging in rated capacities from 1½ to 5 tons or more. The trucks may be equipped with dump bodies, with tanks for bitumen, with special bodies for agitating premixed concrete or with mixers for actually mixing the concrete en route to the site of the work.

The investment in hauling equipment on the average paving project is of major importance. It may even exceed the investment in all the other equipment on the project. The hauling operation is, therefore, one that deserves considerable study and analysis. The cost factor in this operation, as in all similar operations, is the stimulant for improvement in hauling equipment design and in methods of operation.

Estimating Hauling Costs

In order to estimate hauling costs, a determination must be made first of the expense of owning and operating the hauling equipment per unit of time and of the expected production of this hauling equipment for the same unit of time.

An example in estimating the cost of owning and operating a hauling unit per unit of time is shown in Table 1 on page 34 for a 3½-ton truck. The cost of owning the equipment is estimated on the yearly basis and is comprised of depreciation, based on the total estimated life of the unit; such items as insurance, taxes, licenses, storage, etc.; and shop overhauling, the cost of which is not

chargeable directly to a project. The cost of owning, termed "ownership expense," is considered as a reasonably fixed amount per year and is not materially affected by the usage of the equipment. The cost of operating the equipment is comprised of job overhauling, replacements (except replacements of major parts), repairs, tires, etc.; fuel, oil and grease; and driver and other necessary labor, and is generated by usage. It is estimated that the truck will be valueless, either from usage or obsolescence or both, at the end of about 5½ years, that it will be used during this period an average of 10



Public Roads Administration Photo
Bad spots in hauling roads reduce hauling speeds and increase repair, fuel and other costs, thus cutting into profits.

months per year, and that it will be operated 20 days of each working month during its life. The resulting estimated cost of all items of expense is \$19.22 per working day or \$2.40 per hour based on an 8-hour day. The data used in the determination of this cost was selected as an example only. The actual data to be used will depend on the particular

circumstances and conditions of the individual contractor.

Having estimated the cost of owning and operating the hauling equipment unit per unit of time, it is now necessary to estimate the expected production of the hauling equipment unit for the same period of time. The production in tons of

(Continued on page 34)



Don't Expect Wire Rope to Work Too Hard, Either



When you overload wire rope you reduce its safety factor and thereby limit its efficiency and shorten its life. Wire rope that doesn't have an adequate factor of safety (the ratio between the rated breaking strength of the rope and the load applied) can't bend as it should and fatigues rapidly. On the other hand, when a wire rope has an adequate factor of safety its service life is materially increased. For instance, a rope having a safety factor of 6 often lasts twice as long as the same rope having a safety factor of only 4.

Preforming Helps Maintain the Safety Factor

In ordinary wire rope there is frequently unbalanced strand tension which causes "high" or "low" stranding. Preforming wire rope largely eliminates this condition and leaves each strand free to bear its full part of the load. Thus TRU-LAY Preformed Wire Rope frequently helps maintain the original safety factor.

American Cable engineers are glad to recommend the proper rope for your needs. They know the minimum safety factor for all applications (determined after many years of laboratory testing and field work) and recommend ropes they know will give the greatest dollar value. Let us help you with your wire rope problems—of course, without obligation.

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Go Ahead
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Contractors—Prevent loss of tools and other equipment with this EVERHOT Branding Iron

This inexpensive Branding Iron may also be used as a soldering iron or blow torch.

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Dirt-Moving Methods and Costs on Flood-Control Dam

(Continued from page 1)

ect is being financed by Federal funds authorized by the Flood Control Act of 1938, passed after disastrous floods in California and elsewhere. In order to avoid repetition of such costly catastrophes, speed is the watchword on this and similar projects.

Located only 20 miles from the business district of Los Angeles and 10 miles from Hollywood, one end of the new dam almost touches the R-K-O moving picture studio. The Los Angeles River at this point is a small sluggish stream flowing across the broad level San Fernando valley. The drainage basin of the stream, however, covers 155 square miles, mostly in the nearby Santa Susanna mountains where on occasion rainfall reaches deluge proportions.

Because the ground at the dam site was nearly flat, a long low earth-fill structure was indicated. When completed, the dam will be nearly 3 miles long, yet will reach a maximum height of only 50 feet, or 725 feet above the nearby Pacific Ocean. Since there is no deep channel to fill in, the dam is being built in the form of a crescent, with the ends reaching around both sides of the reservoir site.

Moving the Dirt

The principal problem presented to the contractor was that of moving millions of yards of dirt as quickly and economically as possible. The aim was something like that of the army leader whose plan of winning battles was "to get the fust with the mostest men." Envisioning the enemy of Los Angeles as a thunder cloud hovering over the mountains nearby, liable at any time to let loose a deluge of water on the helpless city, Sepulveda contractors are rushing an army of earth men into the job of erecting a great barricade of soil, stone and steel to repel the attack.

Departing from the usual method of excavating with scrapers, power shovels and draglines, Jahn, Bressi & Bevanda revived the use of an elevating grader. This type of equipment was the one mainly employed in grading Los Angeles streets in the teens and twenties, but has been little used in that part of the country since 1927, although extensively employed in other sections. Conditions at Sepulveda are well suited to this type of excavating, the ground in the borrow area being level, free from rocks and of an alluvial sedimentary nature easily worked.

The elevating grader used is a Caterpillar with a 48-inch rubber-fiber conveyor belt driven by a 6-cylinder engine over a 25-foot carrier and pulled by a Caterpillar RD8 tractor. A 30-inch rigid disk plow loosens the earth and throws it onto the conveyor belt which delivers it into a Euclid Trac-Truk traveling at the same speed as the grader.

Nearly all of the dirt trucks used in that section of the country are of the end-dump type, but the Sepulveda contractors decided to employ the bottom-dump type, depositing the load beneath rather than at the end of the truck. Six Euclid Trac-Truks of this type operated so efficiently that two more were purchased, then four additional units, making an even dozen of these speedy earth movers. These Euclid units have sloping sides and ends, to facilitate loading and dumping. The forward end is larger, throwing most of the weight upon the drive wheels of the Euclid tractor which pulls the truck. The tractor is powered by a 150-hp Cummins diesel engine and has an exclusive planetary gear reduction which gives tremendous pulling power, sufficient to move a full load up a 16 per cent grade. With eight gears forward, speeds range from 2 to 21

miles an hour, with the engine operating at 1,800 rpm.

The Trac-Truks are dumped automatically with compressed air and the bottom closed the same way with mechanism operated by a small wheel rolling against one of the truck wheels. This automatic dumping renders unloading stops unnecessary. The tractor drive wheels and the two under the rear end of the unit roll on 20-ply 18 x 24 rubber tires. The material is dumped in windrows about 2 feet high and 9 feet apart, center to center. When leveled down with a Caterpillar No. 12 Auto Patrol, the dirt is the required 6-inch depth for compacting which is accomplished by Kay-Brunner sheepsfoot rollers. The Trac-Truks straddle a windrow which is extended about 70 feet with each dumping.

Each truck holds 13 yards struck-measure but is heaped up to make loads of 16 to 17 yards. Loading time varies from 37 to 47 seconds, or less than one minute, including the time of changing from one unit to another. In nine 8-hour shifts six Euclid Trac-Truks moved 4,555 loads, which is 506 per shift, 84 per truck, 5½ minutes per load. This is approximately 75,000 yards of embankment fill, which is piling up dirt pretty fast.

The diesel fuel used at Sepulveda costs only 6 to 7 cents a gallon, compared to larger amounts of 14-cent gasoline consumed by the gasoline engines on the job. Although the Cummins diesel costs \$1,000 more than a gas engine of similar size, many contractors feel that this is offset by its economical fuel consumption. Ninety per cent of the Euclid Trac-Truks sold last year were equipped with diesel engines.

The borrow pits have a maximum depth of 15 feet. Two cultivators or "scratchers" loosen the dirt packed down by tractor and trailer wheels in

hauling onto the embankment. Eight Caterpillar RD8's are being used on the job.

The upper stratum of material excavated from the control and bypass channels was hauled to the dam, while the lower material, being too wet for this purpose, was placed along the banks, from which part will be taken to fill in on either side of the control channel walls. Rex Speed Prime pumps are used to lower and keep down the water level.

Dirt-Moving Costs

The embankment fill at Sepulveda was figured: 2,400,000 yards at 5 cents; 2,070,000 cubic yards of common excavation at 13 cents; 1,630,000 yards of borrow pit excavation at 14 cents; 8,500 yards of structure excavation at 90 cents; 30,000 yards of levee embankment at 7 cents; 5,000 yards of structure backfill, compacted, at 70 cents; 55,000 yards, uncompacted, at 10 cents; and 5,600,000 squares, each 100 square yards, of additional rolling at ½ cent.

(Continued on next page)

"CAPACITY for minus ½" stone is UNSURPASSED..."

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PROVED PERFORMANCE
Lowest Price for Any Reduction
Crusher of Equal Performance
AND YOU GET ALL THESE FEATURES

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Write for Bulletin IC-34

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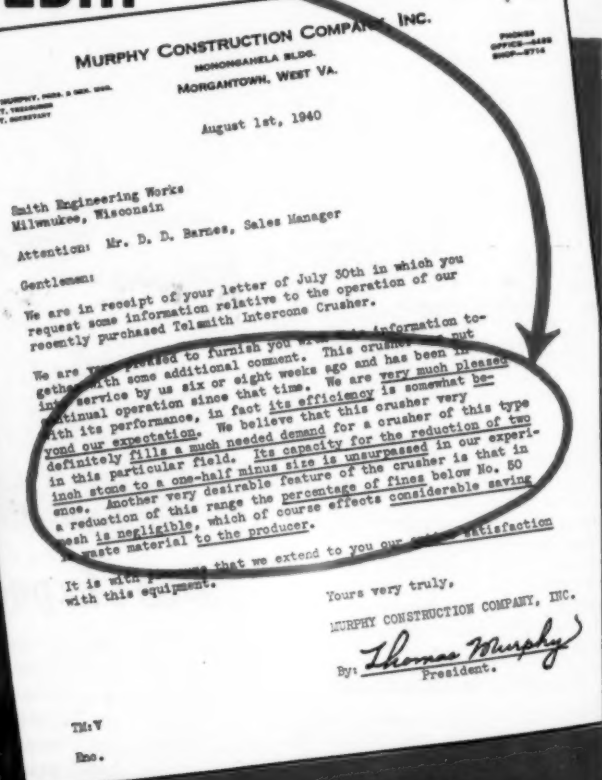
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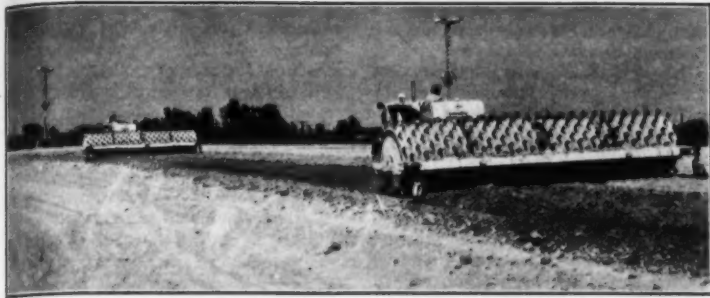
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CHARLESTON TRACTOR AND EQUIPMENT CORP
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All earth placed in Sepulveda Dam is compacted with Kay-Brunner sheepfoot rollers. For night work, floodlight towers are strategically placed about the dam area.

Sepulveda Dam

(Continued from preceding page)

Other excavating equipment used on this job included a 4-yard Bucyrus-Erie 55-B dragline, a 2-yard Koehring 801 and a 1 3/4 Koehring 701 crane-dragline for excavating and for concrete placing, a 3/4-yard Koehring 301 shovel used primarily for trench excavation, and a 2-yard Northwest 80 crane for concrete pouring.

Rock for Embankment

The job of furnishing 325,000 tons of rock for embankment paving and toes was sublet to Tobin Quarries of Kansas City. The stone is obtained from a mountain foothill 12 miles northwest of the dam. Twenty trucks of various makes haul 10-ton loads, moving 1,000 tons daily from quarry to dam. Large stones, which weigh up to 10 tons each, are handled with a steel cable hooked onto one tooth of a power shovel.

A new Traxcavator tractor shovel is proving a very efficient unit for loading rocks at Tobin quarry. This 8-ton machine consists of a Caterpillar 45-hp tractor on which is mounted a 1 1/4-yard skeleton shovel lifting up to 3 tons of rock. The shovel operates flat on the ground, cleaning up shallow material and dropping dirt and other small stuff out through the framework. The winch is located above the engine and is direct-connected with the crankshaft by a chain drive.

Some idea of the extent of the quarrying operations can be obtained from the size of one blast. A small tunnel or coyote hole was driven 40 feet into the rock wall and 40 feet parallel with its face, then loaded with 8 tons of black powder and dynamite. The hole was filled up with hundreds of sacks of tamped-in dirt and a large quantity of loose rock. Another shot of 65 per cent dynamite hurled an 84-pound rock 1,000 feet and dropped it through the roof of an ancient adobe barn.

Concrete Work at Sepulveda

The concrete work at Sepulveda totals 66,180 cubic yards reinforced with 3,750 tons of steel. The finished spillway will contain 33,000 yards in slabs and wall footings at \$4 a yard, with the government furnishing the cement; the spillway ogee and bridge piers, 15,300 yards at \$7.30 a yard; the control works, walls and other structures, 16,800 yards at \$11; and the spillway bridge superstructure, 640 yards at \$25.

The control channel is 83 feet wide, and the spillway 469 feet wide with six concrete bridge towers rising 28 feet above the gravity ogee. The control and spillway channels are being paved with concrete 540 feet below the center of the dam. The control channel will have four ungated openings 6 1/2 feet x 6 1/2 feet and four service gates 6 feet x 9 feet. The bridge over the spillway will be 15 feet wide.

Spillway Construction

The spillway will have a capacity of 109,000 cubic feet per second, and the reservoir capacity will be 16,000 acre-

feet. When water rises to the crest of the spillway gates it will cover 1,330 acres. The full capacity of the reservoir will be 28,700 acre-feet.

A unique feature of Sepulveda Dam is the way in which the flow of water over the spillway will be controlled. Each of the five 57-foot openings between the bridge towers will have a three-cornered steel drum of that length working on an

axle at each downstream corner. When not in use, the upper side of the drums will be flush with the top of the ogee. After the water has risen to a predetermined height, the gates, automatically controlled by water valves, will rise with the water, permitting the desired quantity to flow out of the dam. If the water level should rise dangerously near the crest of the dam, the gates will automatically begin to drop down, permitting more water to escape over them.

The spillway control gates are being made by the Consolidated Steel Co., Los Angeles, and the hydraulic oil pumps which operate the control channel gates are being made by the Commercial Iron Works, Portland, Ore.

Some 16,000 feet of 24-inch sewer pipe was relaid outside the dam site by Artukovich, Los Angeles contractor, for \$117,802.

Aggregate for the spillway concrete is obtained from the lower end of the San Fernando Valley and trucked to the batching plant below the spillway. Four 2-yard Garbro cement buckets are used



This Trackson shovel is used in the Tobin quarry to handle rock for the rock embankment at Sepulveda Dam.

in placing the concrete in locations inaccessible to trucks. These funnel-shaped buckets are made with a steel frame which holds them in an upright position while being transported from batching plant to job. The Ford trucks

(Concluded on page 29)



"M" day IS HERE!

"Mechanize" is the order of the day. That's why the Moto-Crane* is going great guns. Contractors took to this rubber-tired unit right from the start. Scores of them are now in service, handling jobs of every size, shape and description—and it's only the beginning!

The Moto-Crane is outstanding on three counts. It's 100% mechanized, being mounted on a Crane Carrier specially designed for highway and off-the-road travel. Secondly, the patented

sloping machinery frame gives Balanced Design in turntable. That's why this unit can handle big capacities with long booms and low booms (as evidenced above). And lastly, it's as versatile as a one-man band because readily interchangeable boom equipment permits operation as a crane, dragline, clamshell, shovel or backdigger.

The Moto-Crane is available in three sizes. Better get complete information now. Mechanized Moto-Crane service is here to stay.

UNIVERSAL CRANE DIVISION • THE THEW SHOVEL CO.
LORAIN, OHIO
*Trade Mark

UNIVERSAL LORAIN MOTO-CRANE*

NO JOB TOO SMALL OR SHORT—NO JOB TOO BIG OR TOUGH

FACTS ABOUT THE CRANE • THE CARRIER

1. Simplified Center Drive direct-to-the-point power application.
2. High speed transmission range for road travel—low range for tough going off road or on job.
3. Built of standard motor unit parts available all over the country.
4. Close-coupled, 173" wheelbase for better maneuvering. Steering gear designed for soft ground travel.
5. Special chassis frame design which eliminates reinforcing.
6. 10 speeds forward—and 3 reverse. Unit will climb a 30% grade.
7. Backer arm rear end replaces springs—gives flexibility for road travel—stability for operation.
8. 2-place, pin-connected, all welded boom with center sections and straight or goose-neck tips.
9. Cab type teeline which functions efficiently at all boom angles and digging depths.
10. Winch Head and Third Drum attachments.
11. Convertible to Dragline, Clamshell, Shovel, Backdigger.





This Buffalo-Springfield roller, equipped by the B. F. Goodrich Co. with special rubber-covered rolls, has been used successfully to roll a soft stone aggregate on Florida roads.

Rubber Roller Proves Success on Fla. Job

Because a soft stone aggregate used on Florida highways, similar to a soft limestone and known as Brooksville stone, has a tendency to crush under the steel or iron rolls of a conventional road roller, a new type of roller has been developed and has been in use on Florida secondary roads.

The roller is a Buffalo-Springfield 3 to 3½-ton tandem roller with towing attachment consisting of two pneumatic-tired wheels and an adjustable tongue for towing the roller behind a truck.

The Technical Department of the B. F. Goodrich Co. was put to work on the problem of supplying a substitute for the steel or iron rolls so that the Brooksville stone would not be pulverized to the point that its value as road ballast was impaired. A rubber compound was supplied, approximately 1 inch in thickness, to cover two wheels 26 inches in diameter with a face of approximately 17 inches, and one wheel with a 37½-inch diameter and a 38-inch wide face. The two small wheels, side by side, are the steering mechanism, the purpose being to get away from excessive road friction and differential in speed when turning the roller. The large roller is located on the front and is the driving wheel. These conditions added to the problems of the rubber technicians because the twisting action and tremendous torque imposed on the rubber surfaces made it necessary to have a perfect bond between the rubber covering and the steel roller. The Vulcalock process of bonding rubber to metal which has been successful in lining steel tanks and covering printing rolls was used.

A report from the Wm. P. McDonald



Only JAEGER Pumps Have All These Features

- **JAEGER PRIMING JET**—Up to 5 times faster prime and re-prime—no adjustments, no need to "gun" engine.
- **POSITIVE RECIRCULATION CUT-OFF**—controlled by flow, not pressure.
- **ACCESSIBLE SEAL**—outlasts the impeller.
- **PATENTED SELF-CLEANING SHELL**
- **EVERY PUMP FACTORY TESTED** for high capacity and pressure.
- **COMPLETE RANGE OF SIZES, TYPES**—3,000 to 220,000 g.p.h.

Send Today for Latest Catalog and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

Construction Co., which originally purchased the roller and has leased it to road contractors in the district, indicates that the unit has been a success, although it is reported that a 5-ton unit might be favored for the next one.

New 1 1/4-Yard Shovel

A new powerful 1 to 1¼-yard convertible shovel-dragline-crane, Model LS-100, has recently been announced by the Link-Belt Speeder Corp., 301 W. Pershing Road, Chicago, Ill. This new machine is controlled by easy-throw levers and is equipped with a new type of clutch, a booster system claimed to give the "feel" of the load at all times.

Other features include fully enclosed travel brakes controlled from the cab; fully enclosed traction gears running in oil; a 72-inch diameter machine-finished roller-path turntable with patented self-aligning rollers; anti-friction bearings throughout; free floating center-pin bearings; and welded steel

design for strength and resistance to shock loads and to provide positive alignment of machinery parts.

The manufacturer particularly emphasizes the sturdy construction of this machine, which is powered by either a heavy-duty gasoline or diesel engine of a size usually found in large units. The track shoes are 24-inch standard, with 30-inch shoes optional, and the crawlers are smooth and self-cleaning. The LS-100 may be quickly converted from one excavating or handling attachment to another without mechanical alteration.

Further information on the LS-100 may be secured by interested contractors and engineers direct from the manufacturer or from this magazine.

Jaw and Roll Crushers

The Smith Engineering Works, 4014 N. Holton St., Milwaukee, Wis., has recently issued a bulletin featuring the Telsmith line of Wheeling jaw and roll crushers. The Telsmith-Wheeling jaw

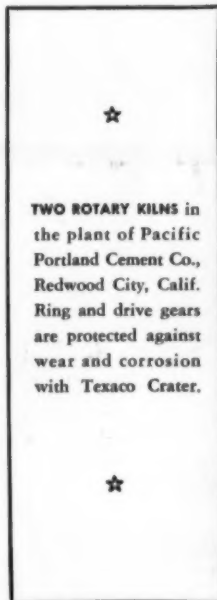
crusher is equipped throughout with cylindrical roller bearings, and the advantages of their use are outlined. Construction features of both the jaw and roll crushers are described and illustrated and there is an informative paragraph on the advantages and disadvantages of the roll crusher.

Copies of this bulletin, No. 264E, may be obtained by those interested direct from the manufacturer.

Myers Joins Gar Wood

Due to increased business activity, H. A. Myers has been appointed Assistant Branch Manager of the Gar Wood Industries factory branch at Vernon Avenue and Broadway, Long Island City, N. Y. Mr. Myers has been associated with the company for a number of years. N. A. Jorgensen is Manager of the New York branch which handles the Gar Wood line of truck and trailer equipment including hoists, bodies, winches, cranes and tanks as well as road machinery.

CEMENT MILL LENGTHENS GEAR LIFE



TWO ROTARY KILNS in the plant of Pacific Portland Cement Co., Redwood City, Calif. Ring and drive gears are protected against wear and corrosion with Texaco Crater.



PRODUCING portland cement from oyster shells, the Pacific Portland Cement Co. has been keeping friction losses and upkeep costs to a rock bottom figure. Open gears on their kilns, oyster shell dryers and clinker coolers have shown less wear, and required practically no attention.

For 10 years, these open gear teeth have been protected against wear and corrosion by lubrication with Texaco Crater. Texaco Crater coats gear teeth with a tough, viscous water and chemi-

cal resistant film that lubricates, protects against wear and weather. Highly adhesive and cohesive, it clings, resists channeling and prevents metal-to-metal contact.

Trained lubrication engineers will gladly cooperate in making savings in your equipment. Just phone the nearest of more than 2300 Texaco warehousing points in the 48 States or write to:

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The Texas Company, 135 East 42nd Street, New York, N. Y.



TEXACO DEALERS INVITE YOU to enjoy Fred Allen in the new full-hour program of The Texaco Star Theatre . . . with Kenny Baker, Al Goodman's Orchestra and a great cast. Every Wednesday Night, Columbia Network, 9:00 E.S.T., 8:00 C.S.T., 10:00 M.S.T., 9:00 P.S.T.



32-PAGE BOOK... Practical, money-saving information on open gear and wire rope lubrication and protection. Yours for the asking.



TEXACO CRATER

Airport Drainage Data

"Building Safety Into Airports—With Efficient Drainage Construction" is the title of a 24-page bulletin recently issued by the Armco Drainage Products Association, Middletown, Ohio. In addition to the bulletin, a preprinted article on "The Nation's No. 1 Modern Airport, LaGuardia Field" is also available. Included in the preprint is a layout map of the field and its extensive drainage system.

Separate copies of the drainage map on a larger scale may be obtained by those interested, and copies of the Hand-

book of Culvert and Drainage Practice published by the Association, covering the subject of airport drainage fundamentals and practical design, may be obtained by those responsible for airport design.

New Catalog on Mixers

The Kwik-Mix Concrete Mixer Co., Port Washington, Wis., has issued a catalog on its latest models of concrete, plaster-mortar and bituminous mixers. These include end-discharge and side-discharge concrete mixers and tilting and non-tilting concrete and plaster-

mortar mixers. Two types of bituminous mixers are described, the No. 6 trailer type and the No. 10 which is available equipped with a power charging skip. According to the manufacturer, efficiency of operation, low-maintenance cost, high production capacity and ease of operation are among their features.

Welding Electrodes

A new 12-page illustrated bulletin recently announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna., describes AC and DC crucible-weld Flexarc welding elec-

trodes for every industrial requirement. Electrodes for the welding of various classes of mild carbon steel, cast iron, stainless steels, aluminum, copper and its alloys, and manganese, and electrodes suitable for arc cutting and hard surfacing are listed. Information is given on the solution of minor welding difficulties, and the physical properties and uses of each electrode and various types of welds produced are discussed in full.

Copies of this bulletin, Descriptive Data 26-645, may be obtained from Dept. 7-N-20, Westinghouse Electric & Mfg. Co.

WASHOUT WIPED UP IN LESS THAN 1 HOUR!

Quick Work on the Part of "Caterpillar"
Diesel Tractor Speeds Traffic Through
Saves Delay on New Bridge Construction
at Mouth of Horsethief Canyon

CAJON PASS, CALIF.—Destroyed by a heavy rain in the night, a section of Highway 66 was closed to traffic for a short time early this morning. All credit for accomplishing quick repairs goes to a bulldozer-equipped "Caterpillar" Diesel D6 tractor owned by White & Wilburn, of Santa Monica.

Throwing its power and weight against the piles of heavy, wet sand and boulders left by the flood, the "Caterpillar" Diesel had the road passable again in less than an hour.

The stretch of highway damaged by the rain by-passes the new bridge being constructed at the mouth of Horsethief Canyon. The tractor's fast action not only relieved regular traffic but assured a steady flow of supplies so that the bridge-building would continue on schedule.

After repairing the washout, the tractor stood by to aid heavy vehicles across the soft fill.

The demonstration at Cajon Pass this morning makes it easy to understand why "Caterpillar" Diesel Tractors are noted for positive traction . . . rugged build . . . and determined, smashing power. Those desiring further information on these machines are directed to see their nearest "Caterpillar" dealer, or write to the Caterpillar Tractor Co., Peoria, Illinois.

Among those expected for the week-end are Rear Commodore and

Mrs. Will who will Wanderer and guests among of Easter; Smith, racing steady

* Available in 5 sizes, from 25 to 110 drawbar horsepower, "Caterpillar" Diesel Tractors meet every need of today's construction work . . . make it possible for you to take advantage of their fuel-economy, dependability, and low maintenance-cost—regardless of whether your job is large or small. Grade-conquering, ground-beating traction and hard-hitting power make for fewer headaches on the job—and more profit when the job is over.

CATERPILLAR

DIESEL ENGINES and ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

Irrigation Canal Lined To Prevent Seepage

Contract for Excavating And Placing Clay in Section of All-American Canal Let to Breedloves

By JOSEPH C. COYLE

† THE mulatto complexion which once marked the mighty Colorado River has cleared considerably since the silt once held in suspension by it has started settling behind Boulder and Parker Dams. Months ago, when a small flow of "seasoning" water was run through the first 22 miles of the All-American Canal, there was little silt left to seal the thirsty sand and, like an elongated sponge, the porous bottom and slopes of the channel drank up the precious "aqua." This was to be expected as, naturally, it would take time to seal the channel. The canal is 150 to 160 feet wide at the bottom and carries an average water depth of 20 feet, and the sides are sloped $1\frac{3}{4}$ on 1.

As a precaution against the possibility of seepage damaging farm lands lying below the canal in the Bard district and in the Yuma Indian Reservation, certain portions of the canal bottom and slopes from Sta. 244+50 to 1029+48 have recently been lined with clay below the high-water line. This lining is 4 inches thick on the canal bottom and 6 inches on the side slopes. Certain sections received a compacted lining during the original construction and therefore are not affected by this project.

The contract for this work was awarded by the Bureau of Reclamation to the J. W. & E. M. Breedlove Excavating Co. of Los Angeles, Calif., on its bid of \$93,040. This was based on an estimated total yardage of 149,000 cubic yards of material to be hauled and placed on the bottom of the canal and 4,200 yards on the side slopes. It was later decided to extend the lining on the side slopes over a greater length of the canal. This was handled under an extra work order and brought the amount of slope lining to 31,519 cubic yards.

Excavation

About 60,000 yards of material, used only on the canal bottom between Stas. 790 and 1029, was hauled from a borrow pit about a mile north of the canal, opposite Sta. 970. About 45,000 cubic yards of overburden was stripped from the pit with a 13-yard LeTourneau Carryall pulled by a Caterpillar RD8 tractor.

Overburden was broken up with a McCaffrey rooter pulled by an RD8 tractor. The material was loaded by a $1\frac{1}{2}$ -yard Northwest shovel.

Material for the side slopes and the remainder of the canal bottom was obtained from a selected portion of the spoil banks of the channel, adjacent to Sta. 350. Here excavation was easy. A $1\frac{1}{2}$ -yard Northwest shovel loaded to 4 and 5-yard dump trucks, spotted to the right and left, in three passes, requiring about 40 seconds, on an average, to each truck. While a load was moving out and

an empty backing in, a Caterpillar D4 with a McCaffrey bulldozer would dart in and round up odds and ends of dirt. A maximum of 35 dump trucks, consisting of Fords, Chevrolets, GMC's and Dodges, were used for hauling.

Placing the Material

After placing and spreading the material between Stas. 790 and 1029 a heavy sectional drag of 14-inch square timbers, pulled by a Caterpillar tractor, and a Killefer disk with 24-inch blades were used to pulverize the lumps. The sandy nature of the canal bottom precluded the use of a roller as the lumps would simply have mashed into the sand. This material was used on the canal bottom in this one section.

Operations began at Sta. 244+50,

which was the upper end of the contract. The loaded trucks entered the canal over a graveled ramp in the canal slopes and the clay was dumped in piles on the canal bottom and spread with a LeTourneau bulldozer on a Caterpillar RD8. Clay placed on the canal bottom was mixed with 4 inches or more of the original surface material which had been broken up by a McCaffrey rooter and scarifier pulled by an RD7 tractor. Mixing was accomplished by two 12-foot double-section 24-inch Killefer disks pulled in tandem.

There were comparatively few rocks over 4 inches in diameter in the selected material, but these were removed by hand, piled up and then loaded into trucks for hauling to nearby points of disposal.

The canal bottom was next wet, using about twenty-four Orr sprinklers on hose lines connected to a 4-inch pipe line laid along the middle of the canal. This operation usually required from 12 to 34 hours, depending on the quality of the clay. Water for sprinkling was

pumped from the Yuma Canal and one of the canal laterals.

After the sprinklers were removed, the canal bottom was allowed to dry to an optimum moisture content and then was compacted with a 19,200-pound roller made by welding heads into a 12-foot section of a 5-foot boiler, with metal baffles welded in every 3 feet inside. The roller was filled with water to bring it to the desired weight. The frame of the roller is of 6-inch tubing with welded joints. The front end is tapered and has a tongue welded in for hitching behind the Caterpillar D4 which pulled it. At the front and rear of the drum a full-length scraper blade is welded to the frame to scrape off mud which might otherwise collect on the roller.

For lining the side slopes, the material was windrowed from the trucks along the base of the slopes and then lifted and spread to a stake line by a $1\frac{1}{2}$ -yard Esco bucket on the dragline boom of one of the two Northwest shovels on the job. Skillful handling

(Concluded on page 26)

*More yardage
each hour*



when you use Bethlehem road steel

Whether it's a small contract or a large job like the new Pennsylvania Turnpike, you'll find that using Bethlehem Road Steel enables you to finish more yardage per hour.

Bethlehem road steel materials are specifically designed to save your time and increase your profits. Bethlehem Road Joints, for instance, are one-piece units, easily installed by one or two men working ahead of the pouring crew. Bethlehem Bar Mats and Reinforcing Bars are delivered to you promptly, cut to the dimensions needed on your job. Bethlehem Highway Guard,

Cable Brackets and Steel Posts are easy and economical to drive and string.

You'll find, too, that it saves you time and money when you make Bethlehem your headquarters for road steel. A single order placed with Bethlehem eliminates unnecessary bookkeeping, telephoning and correspondence.

For higher profits and more yardage completed each hour on your next contract, get Bethlehem Road Steel Service to supply you with all the road steel materials you need.

BETHLEHEM STEEL COMPANY



COMPLETE
WELL POINT SYSTEMS

**WILL DRY UP ANY
EXCAVATION**

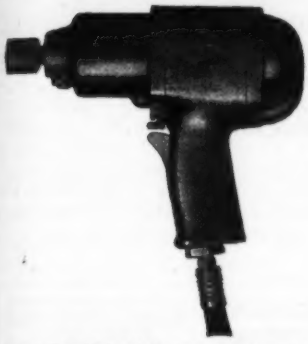
Faster—More Economically

Write for Job Estimate and Literature

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MACHINERY & EQUIPMENT CO., Inc.
Dept. C

36-40 11th St., Long Island City, N.Y.
Tel. IRonsides 8-8800



The new Model 344-R reversible wrench of the power-vane type.

Reversible Wrenches In Three New Sizes

Three new-size reversible wrenches for use in any work where there are nuts to be applied or removed have recently been announced by the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City. These three models, the CP 344-R, CP 349-R and CP 360-R, in bolt-size capacities of $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ -inch respectively, are practically the same in construction, varying only in size and weight.

All three models are of the power vane type, employing a slow-speed rotary motor which is simple in design, efficient in operation and economical in maintenance, according to the manufacturer. These wrenches have no gears or resilient members in the driving unit, and the CP 344-R $\frac{3}{8}$ -inch bolt size is 6 $\frac{1}{2}$ inches long and weighs 4 $\frac{1}{4}$ pounds. The next size, the CP 349-R, handles bolts $\frac{1}{2}$ -inch in size, is 9 $\frac{3}{4}$ inches long, and weighs 9 $\frac{1}{2}$ pounds. The largest of the three, the CP 360-R, has a bolt-size capacity of $\frac{3}{4}$ -inch, is 10 inches long and weighs 13 pounds. Standard equipment for all three models includes 8 feet of 5/16-inch air hose and fittings, and a hexagon socket for nuts $\frac{5}{8}$ -inch, 13/16-inch or 1 1/16-inch across flats.

Three new bulletins describing these three new reversible wrenches have just been issued by the manufacturer which will be glad to send copies to readers of this magazine upon request.

Welding Expert Elected Wellman Vice President

Announcement has been made by the Wellman Engineering Co., Cleveland, Ohio, of the election of Dr. James Campbell Hodge as Vice President and Director of the company. Dr. Hodge, a well-known metallurgist, was associated with Bennett & Christensen, consulting chemists and metallurgists serving foundries in Ohio and Indiana, and in 1927 joined Babcock & Wilcox Co. as a metallurgist, where he developed its process of welding for boiler drums and other important constructions such as the power penstocks for Boulder Dam. In 1932 he became Chief Metallurgist for that company.

Dr. Hodge has served on technical committees of the American Society for Testing Materials, on the Boiler Code Committee of the American Society of Mechanical Engineers, the Welding Research Committee of the Engineering

Foundation, the American Welding Society and the American Petroleum Institute. In 1939 he was joint recipient of the J. F. Lincoln Gold Medal Award for the best paper representing original contribution to the advancement of the use of welding.

Treated Highway Posts

The Wood Preserving Corp., Pittsburgh, Penna., has recently issued an illustrated bulletin on pressure-treated timber posts for highway guard rail, listing the advantages of pressure treatment and describing the types of treated highway posts available from that company. These posts are of two general shapes in cross section, round and rectangular, and of two general pressure treatments, creosoted or pressure-treated with certain metallic salts in aqueous solution. The salts treatment allows the posts to be painted with aluminum or white paints, just as untreated wood is painted, but the posts are not considered as durable at the ground line as pres-



Six American Model KLS reversible moldboard plows and Model 41H underbody hitches on new FWD 5-ton trucks ready to leave the American Hoist & Derrick Co. plant in St. Paul, Minn., on the long trek to Denver, Colo., where they will be added to the snow-fighting equipment of the Colorado State Highway Department. The seventh truck in the caravan is carrying the hydraulic hoists and attachments.

sure-creosoted posts.

Interested state and county highway engineers may secure copies of this bulletin and additional information on the use of treated highway posts direct from The Wood Preserving Corp. by mentioning this item.

Takes Over Bucket Sales

Announcement has been made that the C. S. Johnson Co., Champaign, Ill., has taken over the sales of Dravo concrete buckets made by the Dravo Corp., Pittsburgh, Penna.

Now it's **16** FOR PARKER-SCHRAM AND EATON & SMITH...

BIG WEST COAST OPERATIONS STEP ALONG WITH 2-CYCLE DIESELS

A demonstration PROVED HD-14's dirt-moving ability—started the ball rolling! Two were ordered immediately... then seven! More added as more jobs were hit! 16 HD-14's to date for Parker-Schram and Eaton & Smith—7 at Walla Walla, Washington; 5 at Scappoose, Oregon; 4 at Bear Island, Oregon. Big capacity scrapers, up to 28 yd. also, are hauled and pusher-loaded with the HD-14's.

Try them... on your job... under your own operating conditions! We'll gladly arrange a demonstration.

Suffocating, blinding dust—filled with gritty particles—force tractor operators and engineers to wear respirators and goggles at Mill Creek Dam project—4,700,000 yd. job near Walla Walla, Wash. Tough operating conditions... yet—overcome connected with perfect performance of the series HD-14's and here—two shown in photo above.

On Scappoose, Oregon, Large Project last HD-14's haul big capacity scrapers, and apply them as a pusher—see photo below.

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U.S.A.



3 SIZES: HD-7, HD-10, HD-14
54 TO 108 DRAWBAR H.P.

Do you wish a really superior dumping unit for handling 2-cu. yd. Detachable Baskets?
SEE OUR MODEL LF
(Load Forward)

DEMPSTER DUMPSTER

For any 1 1/2-ton truck
NO COUNTERWEIGHT
OVERHANG
SIDESWAY

All the load on the chassis.
DEMPSTER BROS. INC. Knoxville, Tenn.

Grading 13.5 Miles For Dakota Highway

(Continued from page 2)

had been signed, crews and equipment of the W. H. Noel Co. moved in on the job and set up a complete camp, including bunk cars, cook car, office and repair wagon at a point near the center of the contract.

The Noel contract called for construction of an entirely new grade over the entire 13.5 miles and obliteration of nearly one mile of the old road. The new dirt grade is 36 feet from shoulder to shoulder with a 27-foot plant-mix asphalt wearing course. Streamlined for snow control, the road is built above the surrounding terrain and flanked by wide shallow 12-foot ditches with 4:1 back-slopes.

The soil in the area was clay, especially adaptable to the all-Caterpillar approach the contractor employed. Four Caterpillar Ninety-Five's with 12-yard LeTourneau scrapers proved excellent equipment for excavating and dumping along the series of well-balanced cuts and fills. All additional dirt required for the new grade was taken from side borrow. Where the soil was tightly compacted, a Caterpillar RD8 with a ripper broke the ground in front of the scrapers and where the scraper loads mounted above 12 yards, the same "Cat" doubled as a pusher. The fill was compacted and rolled in 10-inch layers by two Caterpillar RD4's with tandem sheepsfoot rollers. Side slopes were finished with a Caterpillar No. 11 patrol and the same machine was used on the grade, after final watering and compaction, to spread 9,443 cubic yards of traffic service gravel.

Working in two 10-hour shifts, a crew of 40 men to a shift averaged 6,000 yards a day over the entire 559,448 yards of excavation. Grease monkeys and mechanics greased and serviced the equipment, which worked under strenuous conditions in heat and dust, every five hours, insuring smoothly operating machines and preventing costly breakdowns.

Gravel Production

About 11,000 yards of this service gravel for the dirt grade was produced at two pits; one, which ran out after 4,000 yards had been removed, at the north end of the project, and the other at about the middle of the project where the remainder of the gravel was taken out. A Caterpillar Sixty with an Ateco fressno was used at the pits, feeding the hopper of a Cedar Rapids single-unit crushing and screening plant, powered by a Waukesha 85-hp gasoline engine. Gravel was run out on the average of about 60 yards an hour. Eleven Ford V-8 and Chevrolet 4½ to 5-yard hopper-bottom trucks were used. The average dead haul on the job was about 4 miles.

Surfacing

Following the completion and acceptance of more than 60 per cent of the Noel contract, the Northwestern Engineering Co. established its camp on the project and started application of 69,023 tons of gravel and clay stabilized base and almost 200,000 gallons of SC-2 and RC-4 bitumen on its \$84,000 contract. The surfacing was completed in September.

Personnel

Piloting the W. H. Noel Co. of Jamestown, N. D., is Miss Mary Nierling, one of the nation's few women contractors and one of the outstanding dirt movers in the Northwest. For more than a decade, Miss Nierling has guided the destinies of the W. H. Noel Co., not only figuring the bids herself but actually getting out in the field and directing operations when the need arises. Respected in a

field where competition is keen and the going often rough, attractive Miss Nierling rubs elbows with catskinners and talks the language they understand. Her only shyness is before a camera.

No small part of the success achieved by the W. H. Noel Co. has been contributed by the men who direct operations on the job. Long experience and association with the firm have made invaluable such men as Jens Tennefoes of Fargo, Construction Superintendent on this project; Andy Peterson of Jamestown, General Foreman; and J. V. Klontz of Cummings, Foreman of the gravel plant on the job.

Highway Drainage Products

The Clay Products Association, 111 W. Washington St., Chicago, Ill., has recently issued a bulletin outlining the fundamental principles of subsoil and surface drainage and describing typical drainage installations where vitrified clay pipe is used. Specifications for laying vitrified clay drain pipe and for

building vitrified clay pipe culverts are given, illustrated with working drawings. According to the Association, this pipe is moderate in cost, is easy to lay, and has a very long life because it is impervious to acid or alkaline ground waters.

Copies of this bulletin, entitled "Highway Drainage," may be obtained direct from the Clay Products Association by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Bulletin on Concrete Mixers and Equipment

Bulletin No. 167 has recently been issued by the Ransome Concrete Machinery Co., Dunellen, N. J., manufacturer of all types of concrete mixers and equipment. This bulletin covers briefly its entire line of mixers, pavers, pneumatic placers, buckets, carts, bins, towers and mast plants.

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Complete Safety

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THE ECONOMY TRUCKS

FORD

Big jobs are in the making for 1941. They're jobs that have got to be done fast, efficiently, economically. Here are the 1941 Ford Trucks that are built to meet these present-day dimensions for dollar-saving dependability.

They "have everything." Choice of power. Range of wheelbases. Wide range of body and chassis types. And the kind of economy that really counts — over-all economy.

The 95-hp Ford V-8 engine has an extra margin of horsepower not offered in any other low-price truck, and sells at several hundred dollars less than any other truck with equal horsepower rating. The 95-hp engine is teamed up with the famous Ford 85-hp engine that has proved its dependability and economy in billions of miles of payload performance.

There's new styling and there are many new

improvements and refinements. Above all, there is the down-to-earth quality and economy that have made Ford V-8 a symbol of dollar-saving performance in nearly every kind of hauling and delivery work.

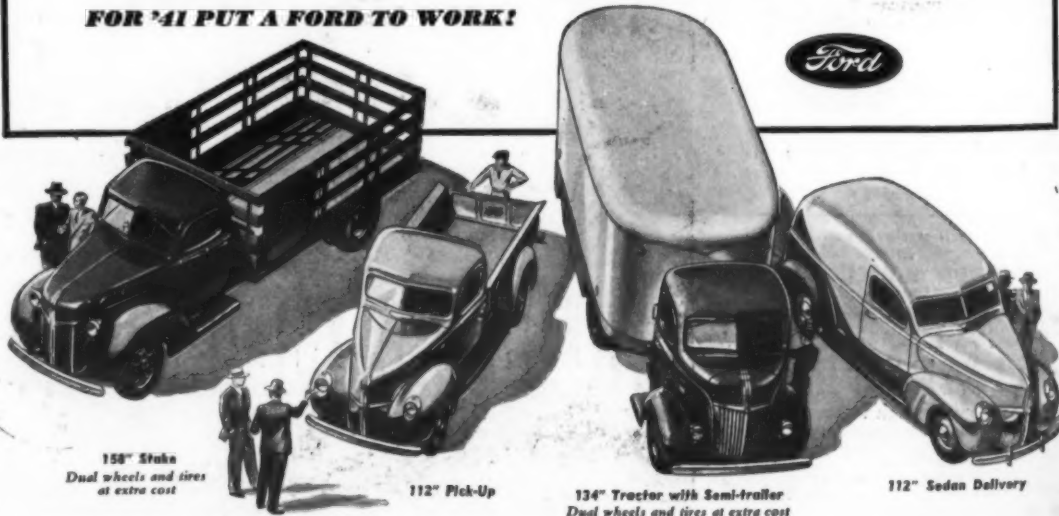
See the Ford V-8 Truck at your Ford dealer's. Put one to work on your job and test it your own way. Prove to yourself that this is the unit to do your job, in less time, at lower cost.

1941 FORD FEATURES

Two V-8 engines — 95 and 85 hp ★ New 4-cylinder 30-hp engine for maximum economy in Commercial Cars, ¼ and One-Ton Trucks ★ Six wheelbases — 42 body and chassis types ★ Full-floating rear axles in all trucks — ring gear thrust plate ★ ¼-floating axle in Commercial Cars ★ Straddle-mounted driving pinion ★ Big hydraulic brakes ★ Two-speed axle as well as reinforced frame in trucks for heavy-duty service are optional at extra cost.

Ford Motor Company, builders of Ford V-8 and Mercury Cars, Ford Trucks, Commercial Cars, Station Wagons and Transit Buses

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156" Stake
Dual wheels and tires
at extra cost

112" Pick-Up

134" Tractor with Semi-trailer
Dual wheels and tires at extra cost

112" Sedan Delivery

Subsurface Drains Chase Frost Boils

Connecticut Has \$200,000 Program to Stabilize Weak Subgrade Conditions with Perforated Underdrains

(Photos on pages 1 and 44)

TO remove permanently all frost boil and weak subgrade conditions due to subsurface water in the older roads in Connecticut, the State Highway Department is undertaking a \$200,000 program this year to install bituminous-coated perforated corrugated metal pipe wherever test pits show ground water conditions to be a cause of pavement breaks.

A part of State Route 14 near Willimantic went to pieces due to frost boils. Test pits 3 feet square were dug to locate the seepage line and then a system of drainage pipe was installed in 1939 to remove the water. The work was entirely successful. The 1940 program calls for the installation of 55,000 feet of perforated pipe, mostly 8 inches in diameter, but some of larger dimension will be used where surface water also must be removed.

Typical Installation

In Colchester, Conn., 1,500 feet of drain was required in 3 miles of highway in a section with reasonably high ground water. This is a fair average for the entire program under way this year which is taking care of only the worst locations where maintenance costs have been the highest. A large part of the installations will average only 500 to 600 feet in length, draining the subgrade to the nearest culvert or outlet.

Inspection of Old Installations

Before the present program was started, numerous old drains were dug up and found to be completely filled with silt. These older drains had been backfilled with stone 2 to 3 inches in diameter and when the ground had become saturated, particularly in clay and fine sand, with clay or silt, the saturated material had run into the large voids and then entered the old vitrified pipe through the open bell and spigot joints. This led to a complete change in backfilling methods as described below, and also to the development by the Department of the inspection manhole.

Trenching

In order to expedite the large program being undertaken this year, hand excavation has been dispensed with as far as possible and a number of $\frac{3}{4}$ -yard power shovels, equipped with backhoes or rigged as cranes for use with clamshell buckets where the machine could

not straddle the trench, have been rented. In a few cases, as shown in the illustration on page 44, pneumatic drilling and blasting have been necessary to break through ledges which formed dams pooling the ground water above them and causing frost boils. The trenches have been excavated so that the underdrain could be laid at a minimum grade $3\frac{1}{2}$ feet below the pavement or shoulder grade and always on the side of the highway at which the flow of water entered the subgrade.

Backfilling

The examination of some of the older drains which had become clogged by silting and a careful study of the literature on the character of backfill for drainage trenches led to the use of

screened bank-run gravel with a maximum screen size of $\frac{3}{4}$ to 1-inch but mostly $\frac{1}{4}$ to $\frac{1}{2}$ -inch material. A valuable report made December 1, 1931, to the Aeronautics Branch of the U. S. Department of Commerce by a Committee on Airport Drainage and Surfacing representing the Aeronautics Branch, the American Engineering Council and the American Road Builders' Association, contains the following helpful statement regarding backfill: "In order to prevent clogging of drains by silting, the pervious material should be crushed rock, gravel, or crushed slag, ranging in size from $\frac{1}{4}$ inch to $\frac{1}{2}$ inch. By the use of the small-size material, erosion of the sides of the trenches will be reduced and less silting will occur."

The Connecticut highway authorities found one pit near Goshen, Conn., which has very clean sand with gravel $\frac{3}{4}$ to 1-inch maximum size which is being used with great success for backfilling in that locality. Elsewhere the $\frac{1}{4}$ to 1-inch screened bank-run gravel is being used for backfill. For economy in han-



An inspection manhole in the shoulder of a Connecticut State Highway.

dling, the backfill material is dumped directly from the tail-gate of the dump (Concluded on page 38)

WORTHINGTON AIR TOOLS



WJ-60
Rock
Hammer



WJ-45
Rock
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WB-85
Pavement
Breaker



WSD-85
Sheeting
Driver



W-19
Clay
Digger



W-16
Trench
Digger



W-8
Backfill
Tamper



Rock Master
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WJ-45 ROCK HAMMER



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**GREATER
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The latest development of a powerful, medium-weight, all-purpose drill.

A lot could be written about the fast rate of penetration, the low air consumption, the powerful rotation, the ease of handling, the hole cleaning ability, the sturdy simple retainer, the convenient throttle control, and the positive acting valve ... but let a demonstration on your job convince you that this is a general utility drill primarily designed for fast drilling ... with a consequent low cost per foot of hole. Just name the time and place.

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THE HAYWARD CO., 32-36 Day St., New York

Hayward Buckets



The new Model C Tournapull, the smallest in the line.

New Small Tournapull

Combining the speed of a truck and the power of a tractor with the self-loading and self-spreading features of a dirt-moving scraper, R. G. LeTourneau, Inc., Peoria, Ill., has developed its third and smallest Tournapull known as the Model C. Powered by a Caterpillar 4-cycle 6-cylinder D-468 diesel engine, it has a top speed of 13 to 15 miles an hour, depending on its tire equipment, and develops a maximum bhp of 90 at 1,800 rpm.

To give the greatest possible traction per pound of weight, the entire weight of the engine and half of the weight of the Carryall scraper and its load are placed on the two large pneumatic-tired drive wheels by the elimination of front wheels. The tires spread over a large ground area under the weight of the unit and the load, thus increasing gripping power and traction.

Steering is accomplished by independent operation of the two drive wheels, each controlled by a slow-speed heavy-duty double-cone clutch, using a metal lining running in oil. This type of steering and the resulting close-coupled unit make for short turning and easy maneuvering. Two different sizes of tires are available: 21 x 24's and 18 x 24's.

The dirt-moving unit is the newest Carryall scraper, the Model LS, with a struck capacity of 8.2 cubic yards, and including the latest LeTourneau features of crescent arch A frame, larger apron and traveling sheaves controlling the apron.

In addition to the Model C Tournapull, there are the two previously introduced units: Model A, powered by a D17,000 Caterpillar diesel and operated with a NU 45-yard, an N 33-yard or a RU 30-yard Carryall or a 30-yard Tournatrailer; and Model B, using a D-13,000 Caterpillar diesel and pulling either a Carryall or a Tournatrailer rated at 19 cubic yards heaped capacity.

Material-Handling Units

A new Redler conveyor-elevator Catalog No. 140 has recently been issued by the Stephens-Adamson Mfg. Co., Aurora, Ill., and includes many additions to the previous catalog on the Redler line. Both horizontal and vertical closed-circuit units are covered, with complete specifications and dimensions. Three different types of the horizontal closed circuit conveying element are illustrated. Wash drawings of elevation sections of each of the standard Redler shapes are shown, all dimensions are completely brought up to date, and the specifications cover the new streamlined design now standard on all Redlers.

Copies of this catalog may be obtained by those interested direct from the manufacturer by mentioning this magazine.



Complete Line
of
DERRICKS
and
WINCHES

HARGEN DERRICK CO.
3101 W. Grand Ave. Chicago, Ill.

Handy Electric Saw For Cutting Jobs

The Beebe Little Cut-Up saw, made by Beebe Bros., 2724 Sixth Ave., So., Seattle, Wash., is designed to handle all types of small wood-working and cutting jobs, including form work on construction jobs, sign cutting in state or county highway garages and any other work of this type.

Model A has a cutting clearance of 2-inch thickness and 16 inches deep, with a 32-inch swing. It is equipped with a General Electric or equal 1/6-hp motor operating on a-c 110-volt single-phase current, complete with a 6-foot attachment cord with push switch and lamp socket plug-in. The saw is driven direct from the motor by a ball-bearing connecting rod. The saw frame is of the best channel steel with steel frame supports electric-welded to the frame. It has a steel saw table, 6 x 8 inches in size, with a soft metal saw slot insert, electric-welded to the saw frame. Four saw blades are furnished with each Little

Cut-Up, one 1/8-inch, a 3/8-inch blade, a 1/4-inch and a special blade for metal cutting. Extra saws are available to suit various purposes.

Literature describing this and other models of the Little Cut-Up saw may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

New Welding Gloves

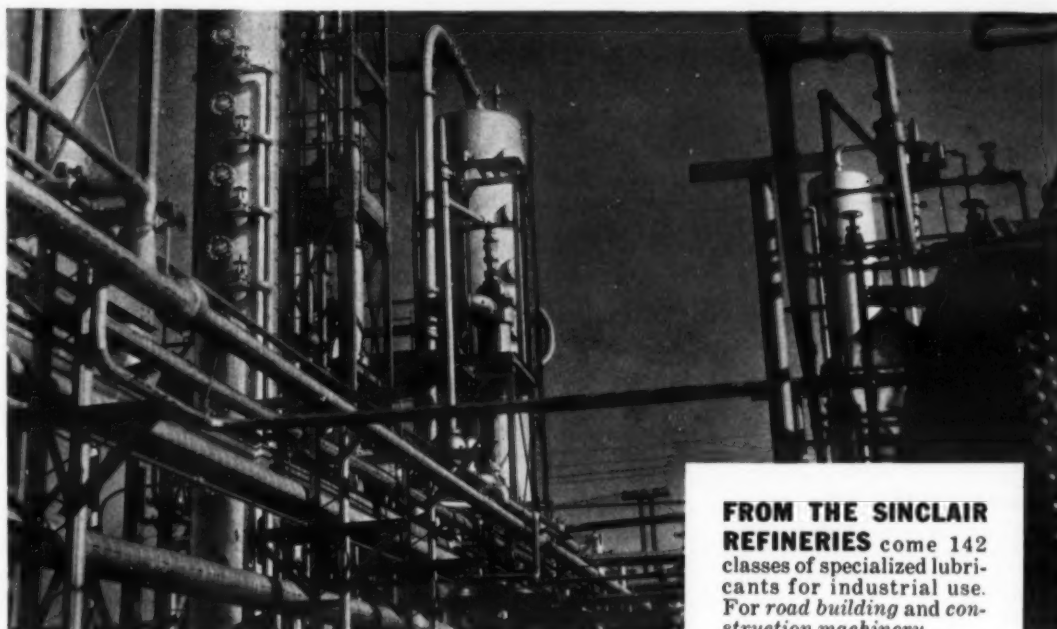
Two new-design welding gloves have recently been announced by the American Optical Co., Southbridge, Mass. The first one, known as the TX100, is made from a good grade of chrome tanned horsehide with no seams at all exposed to active wear. The back of the glove is of one piece, removing any chance of seam breakage under extreme heat, and the inside is insulated with wool. The other new glove, of slightly different design, is made from chrome tanned horsehide with a seamless palm. All seams of this 3015 glove are at the back of the fingers, except for welt-reinforced

seams at the base of the second and third fingers.

Hoists and Dump Bodies

The Burclift hoist, made by the Burch Corp., Crestline, Ohio, is of the piston type built from seamless steel tubing with the head securely welded at the high pressure end. It is mounted in the sub-frame in a manner permitting oscillation, thus maintaining a direct line of piston travel to the toggle bar without strain on the piston rod or cylinder. The cylinder is 7 inches in diameter and 25 inches long and is built integral with the pump and valve, thus eliminating all oil lines and connections.

This Burclift hoist, the Burch Hydromotor two-way hoist, and various types of Burch standard steel dump bodies are fully described and amply illustrated in Bulletins DB35 and DB4, recently issued by the manufacturer. Copies may be obtained by writing direct to the Burch Corp. and mentioning this magazine.



FROM THE SINCLAIR REFINERIES come 142 classes of specialized lubricants for industrial use. For road building and construction machinery...



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There is a Sinclair product for correct lubrication of your equipment. Some 2000 Sinclair Agents make convenient, speedy delivery of Sinclair lubricants and fuels. See the nearest Agent.

ALLIS-CHALMERS MODEL "L" TRACTOR and GAR WOOD SCRAPER on a 150,000 yard road construction job of the Gas Construction Co., Warsaw, Indiana. This and other equipment of this company has been Sinclair lubricated for the past 3 years.

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SINCLAIR REFINING COMPANY (Inc.)

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Aggregate Production In Shelby County, Tenn.

(Continued from page 2)

out 18 inches beyond the 10-inch suction to free it of any obstruction at the opening.

Screening and Washing

The dredged material is delivered through a 10-inch pipe line to the mixing chamber at the washing plant. This is a water-tight wooden chamber 4 feet square and about 6 feet high, which receives sand, gravel and water at a maximum rate of 200 tons per hour through a 10-inch pipe projecting 4 feet vertically through the bottom of the chamber. The bottom is pitched toward a discharge opening to make the chamber self-cleaning. Here the material is broken up for the operations which follow.

The material passes to a long revolving screen, 48 inches in diameter x 18 feet long, having an outer jacket 14 feet long with $\frac{1}{8}$ x $1\frac{1}{2}$ -inch slotted perforations. The main screening shell has $\frac{3}{8}$ -inch perforations for the full length of the outer jacket, and 2-inch perforations from there to the discharge end. Over-size gravel, 2-inch and larger, is discharged from the end of the screen by a chute to a ground storage pile.

Sand smaller than $\frac{1}{8}$ -inch passes through the outer jacket of the screen into a steel collecting hopper and then is carried up a 20-inch diameter dewatering screw, 18 feet long, driven by a $7\frac{1}{2}$ -hp Westinghouse motor. The sand is then delivered to a Link-Belt 18-inch wide x 194-foot long inclined belt conveyor which extends to the top of a 3-compartment storage bin. This conveyor is inclined approximately 11 degrees from horizontal and operates at a belt speed of 300 feet per minute. It is equipped with a 3-way discharge chute, permitting delivery to the three 150-cubic yard sand bins, which are constructed of wood and are of sufficient elevation to deliver to trucks from the bottom of the bins.

Gravel Production

The gravel from $\frac{1}{8}$ -inch to 2-inch is collected in a water-tight steel hopper discharging into a 20-inch-diameter double-paddle "log-washer" in which the material is scrubbed and further dewatered.

From the log washer the dewatered gravel is discharged to the top deck of a Link-Belt double-deck 3 feet wide x 6 feet long vibrating screen, equipped with nozzles for further washing the gravel. This screen separates the gravel into two sizes: plus $\frac{3}{8}$ -inch to minus 2-inch which passes over the top deck, and plus $\frac{1}{8}$ -inch to minus $\frac{3}{8}$ -inch, which is discharged over the lower deck. The material smaller than $\frac{1}{8}$ -inch passes through the lower deck and is discharged into a large lagoon with the wash water away from the dredging pit. The two sizes of gravel are discharged respectively on the two Link-Belt 18-inch wide x 166-foot long belt conveyors, inclined 14 degrees from the

horizontal and operating at a speed of about 150 feet per minute, extending to the top of the gravel bins. Each belt is equipped with a 2-way discharge chute at the head, delivering to two 150-cubic yard gravel storage compartments. This bin is constructed of treated wood and has four compartments of 150-ton capacity each.

J. H. Bigbee is Superintendent in charge of the Shelby County sand and gravel plant, and P. Y. Isbell is Chief Engineer.

Wire Rope Clips

The best wire rope is no stronger than the clips that fasten it, according to the American Hoist & Derrick Co., St. Paul, Minn., manufacturer of the Crosby clip. This clip is of drop forged steel and is hot-dip galvanized against rust and corrosion. It forms a steel vise designed to grip wire rope without injury to the strands.

Further information on these clips may be obtained from the manufacturer.

Larger Payloads with New 1941 Truck Mixers

The new drum sizes just announced by the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio, for its 1941 line of truck mixers are designed to increase the payload to the maximum that the trucks themselves should carry, loading through the top in one quick drop and allowing for ample void space which is necessary for producing highest strength concrete.

Standard capacities for the 1941 models are at least $\frac{1}{2}$ yard larger than on previous models, except the $5\frac{1}{2}$ -yard size which remains unchanged. The compactness of the mixers is such that the 2-yard size with a 104-cubic foot drum is easily mounted on a short-wheelbase Ford-type truck. Other features of the 1941 mixers include vacuum-controlled truck engine drive operated from the cab with separate engine drive if desired; shock-proof two-speed transmissions; the new Jaeger Uni-Valve, consisting of one accessible water control panel for



The Jaeger 1941 truck mixer.

mix, tempering and flush valves; and patented Sypho-meter water tank.

Complete information on these latest model Jaeger truck mixers may be secured direct from the manufacturer.

New Marion Chicago Mgr.

The Marion Steam Shovel Co. has announced the appointment of D. E. Rizor as Manager of the Chicago District, succeeding John L. Steward who resigned. Mr. Rizor is thoroughly familiar with this district, having previously spent considerable time working out of the Chicago office.

WHAT COUNTS IS THE VALUE THAT SHOWS UP ON THE JOB

THERE'S a great deal more to International Trucks than meets the eye when you see them rolling along with their loads or standing on the showroom floor.

We mean the things you'll find out only after you put Internationals on the job... things like their *lasting economy, dependability, trouble-free performance, stamina, and long life.* You can't put your finger on qualities like these *but owners know they're there.* That's why men keep coming back to International when they need new trucks!

International reputation is built as much

on these "hidden values" that come out day after day and year after year as on the sound engineering, quality construction, and all-around mechanical excellence that go into these trucks. Ask any International owner... and then see for yourself by putting the right Internationals to work on your own loads. Sizes range from Half-Ton units to powerful Six-Wheelers. See the nearby International dealer or Company branch for complete information.

INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago, Illinois



Many International Trucks, from light-duty models to powerful six-wheelers, have been employed by various contractors on the Pennsylvania Turnpike. This shows one of the Internationals on the job, working for Bates & Rogers Construction Corporation.

SAND'S-STEVEN'S Line & Surface LEVEL



Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8531 Gratiot Ave. Detroit, Mich.

INTERNATIONAL TRUCKS

Pennsylvania's Program Of Traffic Line Marking

New Revised Markings Result of
Legislative Act Increasing Sight
Distance from 300 to 500 Feet

By RAY F. RIEGELMEIER,

Traffic Engineer, Pennsylvania Department
of Highways

✦ A recent Act of the Pennsylvania Legislature increased the required sight distance for overtaking and passing another vehicle on highways from 300 to 500 feet. This necessitated a revision of the previous methods of placing traffic guide lines on the highways. Therefore new pavement markings have been devised and are now being used to indicate to motorists where overtaking and passing are prohibited.

The new marking consists of single lines, double lines and broken lines. Various combinations of these three types of lines are also used to mark special conditions. Past experience has shown that complicated markings cause confusion, and the new painting standards have been devised with the idea of simplification. White has been adopted as the standard color and the width of all lines has been standardized at 4 inches. The only exception is the marking at cross walks where two 8-inch lines are placed across the highway 10 feet apart.

Single-Line Markings

Single-line markings are used at horizontal and vertical curves on two and three-lane highways, all vertical curves being measured for a 500-foot sight distance. This sight distance is measured from eye to eye level, 4 feet 6 inches above the ground. A single solid line indicating "no passing" is provided over each vertical curve.

Horizontal curves on two-lane highways are marked where the sight distance is less than the required 500 feet.

A new type of marking on horizontal curves on three-lane highways permits the movement of a single line of vehicles into the curve and a double line of vehicles away from the curve. Passing is not permitted until the sight distance is somewhat greater than 500 feet. This type of marking supersedes the previous scheme which permitted only one moving lane in each direction around the three-lane curve.

These two markings serve as a guide to motorists ascending a hill or entering a curve. Passing is permitted beyond the crest of a hill or beyond the point on a curve where the sight distance again becomes 500 feet, if there is no opposing traffic.

Horizontal curves on two-lane highways which have a radius of 700 feet or less are marked even though the required visibility exists. Markings on these sharp curves furnish an added safety factor to motorists.

A single center line is also used for a distance of 300 feet on either side of

crosswalks at school zones as an extra precaution.

Double-Line Markings

Double lines are used at all transition points where a four-lane highway narrows to a three or two-lane width. Normally a single center line is used on four-lane highways but at specific locations where traffic is heavy a double-line barrier is used as a safety measure.

Railroad grade crossings are also marked with double lines.

Broken-Line Markings

Broken lines are used for a dual purpose, either as fog lines or as lane lines. In either case, they serve merely as guide lines and may be crossed if the visibility ahead is not restricted.

Fog lines, consisting of a 15-foot painted line and a 25-foot space, are used in areas where fogs are prevalent. Passing should not be attempted under foggy conditions where visibility is limited.

On four-lane highways, the two lanes in each direction are sometimes separated by broken lines. At locations where unusually heavy traffic movements exist, these lines are placed on the highways to serve as lane lines and confine motorists to their proper locations on the roadway.

Extra Up-Hill Lanes

Consideration has been given to the delays caused by slow-moving vehicles on ascending grades. Three-lane highways are provided with two up-hill and one down-hill lanes to enable the faster moving cars to pass trucks on ascending grades. However, over the crest of vertical curves where the sight distance is insufficient, a single lane in each direction is established for safety.

Obstruction Markings

Abutments and wings of underpasses, culverts and portals of bridges, where they are in close proximity to the edge of the roadway, are striped black and white. The markings are placed diagonally to provide the illusion of narrowing of the pavement and consist of 6-inch alternate black and white stripes at a 45-degree angle to the roadway.

Increased Markings

These new standards materially increased the amount of traffic markings placed on the highways. Approximately 4,000 miles of solid line and 2,000

miles of broken line are included in the present painting program in Pennsylvania. These 6,000 miles of pavement markings represent a very definite contribution on the part of the State Highway Department toward the reduction of motor accidents and fatalities on the highways.

A New Truck Model For Heavy Hauling

The new Model LM heavy-duty truck model recently announced by Mack Trucks, Inc., Long Island City, N. Y., is designed particularly for heavy hauling over the highway. This new truck incorporates all the refinements of modern truck design and construction.

The LM is offered in two standard wheelbase lengths of 176 and 194 inches, with special lengths of 212 and 230 inches available if desired. Standard equipment includes, among other features, double-acting hydraulic shock absorbers on front and air brakes. Power is furnished by a 6-cylinder Model EO Mack Thermodyne engine with 4 $\frac{3}{8}$ x 5 $\frac{3}{4}$ -inch bore and stroke, developing 142 hp at a governed speed of 2,200 rpm. The larger model EP Mack engine, developing 160 hp at a governed speed of 2,100 rpm, is available at extra cost. Drive on the LM is from a dry single-plate clutch 15 inches in diameter through a five-speed transmission which is offered with either over-gear or direct fifth speed. Brakes are of the mechanical type, air-operated, with a total braking area on all four wheels of 710 square inches.

For those desiring diesel power, the new Mack LM may be equipped with the Model ED Mack-Lanova diesel of 519 cubic inch piston displacement.

Essentials For Credit

In Time Payment Selling

The Credit Utility Co., Inc., 122 East 42nd St., New York City, has published in booklet form an address made by W. D. Van Buskirk, Vice President of the company, before the Construction Machinery Credit Group at the 1940 A.R.B.A. Road Show in Chicago. The subject of the address is "Credit Essentials in Time Payment Selling" and it discusses the questions of establishing sources of credit information, selling construction equipment on the time-payment plan, and other phases of the extension of credit on purchases of

machinery and equipment.

Copies of this booklet, which should prove of interest and value to manufacturers, dealers, and distributors of contractors' equipment, may be obtained by writing direct to the Credit Utility Co. and mentioning this magazine.

Minute "HOW" Stories



STREET'S FACE "LIFTED" with LeTourneau Carryall

To take off black top surface, preparatory to widening U. S. Hy. 31 through Spring Hill, Tennessee, and at the same time maintain traffic, presented a tough assignment to contractors Bell & Bell. They solved it by bringing their regular roadbuilding LeTourneau Model G Carryall Scraper to the job.

Digs, Hauls, Stockpiles

Despite difficult digging conditions, the Carryall, working behind a "Caterpillar" D7 tractor, loaded the black top with comparative ease. In one cycle of operation, the Carryall cut along the surface, loaded, hauled and stockpiled



the material along a side street, for later use in resurfacing.

Thus, this one-man method of construction kept the highway unobstructed for continuous traffic; the flat, level Carryall cuts also kept the grade clean-cut for future work.

Your LeTourneau-"Caterpillar" dealer can show you many other money-saving Carryall Scraper operations. See him TODAY for a demonstration right on your own job.

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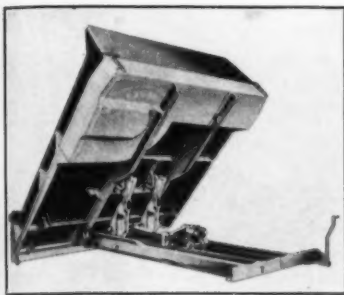
Buy BY COMPARISON

For years Road Contractors, State and County Highway Officials have known the dependable performance of Huber Road Rollers. Today, Huber offers a still greater roller with features designed to do a better job — and do it cheaper.

Write for detailed catalogs.

THE HUBER MFG. CO., MARION, OHIO

BUY A HUBER



The Hercules tire and tool pack dump body, showing the compact compartment for storing tires and tools.

New Dump-Body Styles

The exhibit of the Hercules Steel Products Co. of Galion, Ohio, at the National Automobile Show in New York City on October 12-20 will feature the exclusive tire and tool pack dump body made by that company. This unit has, as an integral part of the body, a compartment which solves the problem of a safe convenient place to carry extra tires, tools, flares and other necessary accessories or equipment. Fitted and locked doors on both sides of this large compartment protect tools from damage or loss.

The Hercules patented design of this latest model dump body allows the body to mount without extra height, and adds extra strength to the body as well as giving a more finished appearance to any assembly, according to the manufacturer. Other features of these bodies are the center-lift hoist, tail-gate lever mounted on the hoist sub-frame, dash controls for both hydraulic hoist and power take-off, and reversible-type tail-gate hardware.

Other equipment on display at the Show includes a giant 10-inch cylinder dump-body hoist and several models of the Hercules split-shaft power take-off. Readers of CONTRACTORS AND ENGINEERS MONTHLY who are unable to attend the Show may secure full information on these latest Hercules models direct from the manufacturer by mentioning this magazine.

New Bulletin On Hose

In a bulletin recently published, the Sullivan Machinery Co., Michigan City, Ind., illustrates and describes various types of hose for air tools used in the construction, industrial, mining and petroleum industries; tough hose for heavy construction; flexible hose for easy handling; combination air and water hose and suction hose.

Copies of this bulletin, No. 87-Z, may be secured by writing direct to the manufacturer and mentioning this magazine.

Road Maintenance Tips

This is the title of a new handy pocket-size booklet on the maintenance of calcium-chloride-surface-consolidated roads recently issued by the Solvay Sales Corp., 40 Rector St., New York City. Designed primarily as a reference book for patrolmen and others actually engaged in the work of maintaining roads, it should prove of interest and value to all highway engineers.

In addition to general tips on main-

tenance, it includes sections on drainage and crown, road shoulders, calcium chloride spreaders, miscellaneous data on weights and measures, tables showing road coverage per 100-pound bag of calcium chloride, and tables on calcium chloride coverage at various settings of the Solvay-Van Brunt spreader.

Copies of this little book may be secured by interested state and county highway engineers without charge or obligation by writing direct to the Solvay Sales Corp. and mentioning this item.

Trucks for Varied Uses

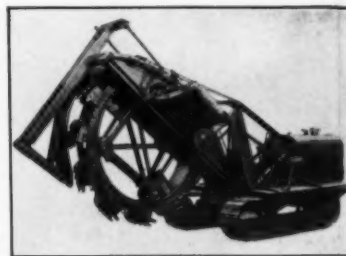
The Brockway Motor Co., Inc., Cortland, N.Y., has recently issued a catalog replete with illustrations showing Brockway trucks serving a wide variety of industries. These include trucks for contract haulers, state, county and town highway departments, contractors, and units in use in several South American countries.

Copies of this catalog may be obtained direct from the manufacturer.

New Wheel Trencher

An addition to the Buckeye line of rotary wheel-type and boom-type trenchers has recently been announced by the Buckeye Traction Ditcher Co., Findlay, Ohio. This new Model 12A wheel-type trencher incorporates a number of new features in a single rugged compact unit.

The excavator wheel frame is of a new trussed bridge construction providing greater strength and resistance to distortion. A "fluid coupling," which is optional equipment, positively protects transmissions from sudden shocks and prevents engine stalling, according to the manufacturer. The conveyor belt has a new type of belt guide clips, developed by Buckeye, to insure even tracking of the belt and at the same time minimizing belt and pulley wear. The excavator drive is the Buckeye constant center type which eliminates the need for idlers to take up the chain slack and provides a smooth flow of power at any digging depth of the excavator wheel.



The new Model 12A Buckeye trencher.

The new Model 12A cuts trench up to 26 inches in width and 5 feet 6 inches deep. Its overall width, exclusive of the spoil conveyor, is 6 feet 8 inches and its overall digging height is 8 feet 1 1/4 inches. A wide range of cutting feeds, conveyor belt speeds and travel speeds are provided for all types of work.

Copies of Bulletin 46 contains further details on the Model 12A trencher and may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.



A 3/4 yd. Strayer Portable Concrete Plant in Chicago averaged 24 yards of concrete an hour pouring 150 batches in 5 hours.

A 3/4 yd. Strayer Portable Concrete Plant on Penn Highway made 115 moves on 8 jobs to pour 11,000 yards of concrete.

A 3/4 yd. Strayer P. C. Plant averaged 1200 cu. yards of concrete a week on one big job in the East.

Operator can weigh batch of aggregate in 15 seconds.

"It takes about 30 minutes to dismantle the Strayer Plant for travel to next job and less than 60 minutes to set 'er up and start concrete pouring." Somewhere in Indiana

CLIP the coupon and mail today for lowdown on this money-making machine. Be prepared to win profitable new concrete contracts with one of the 3 sizes of Strayer Portable Plants. We want every Contractor to know about this plant whether he is interested now or not for it's a natural.



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IDAHO SNOW. It won't be long now before the entire northern section of the country will be tackling the same kind of job that the Sandpoint Highway District in Idaho did last winter with this Adams No. 51 62½-hp diesel motor grader.



THE WHOLE FAMILY. Everybody works with Father in the Brooks family. From left to right are Rex and Archie; Freddie, a nephew; Neta Bess, the daughter; and Contractor and Mrs. Fred Brooks, all of whom, except Mother, operate one or more units of Caterpillar-powered equipment on construction jobs in northeastern Missouri. Mrs. Brooks looks after the comfort of the family.



GIANT STEPS 15 feet high and 15 feet wide in a cut 80 feet deep were made by Frank Hilen on a relocation of U.S. 127 near Magnolia, Iowa. The "treads" slope back and drain at one end through 18-inch openings into 24-inch Armco corrugated pipe and slope drains. Two Allis-Chalmers MD-14 tractors are seen loading a Gar Wood 20-yard scraper.



R. A. Wargel Photo

SAW MILL WIDENING. This heavily traveled parkway in Westchester County, N. Y., is being widened for 8,500 feet by the Mount Vernon Contracting Co. The scene above is at the McLean Avenue crossing at 3 p.m. on a weekday.



C. & E. M. Photos

WASHOUT. The record rainfalls accompanying the August hurricane in Virginia and the Carolinas sent highway and bridge damages to new highs. On U. S. 58, east of Danville, Va., the Dan River topped a 2,000-foot long fill across the lowlands, washing away about 4,000 cubic yards of fill material, and did considerable damage to the pavement, exposing interesting cross sections of embankment and road base and surface courses. The cost of repairs to this one section will be approximately \$5,000. The work is being done entirely by state maintenance forces.



UNDERPASS GETS UNDER WAY AT BARBOURSVILLE, VA.



E. C. Bramham Construction Co., of Halifax, Va., started work on a 1.4-mile underpass and approaches with a Gardner-Deaver compressor on the north side of the tracks where jackhammers drilled the holes that were fired with Volunteer 40 per cent gelatin dynamite. The broken ledge was loaded by a Lorain 75-D and hauled to the fill.

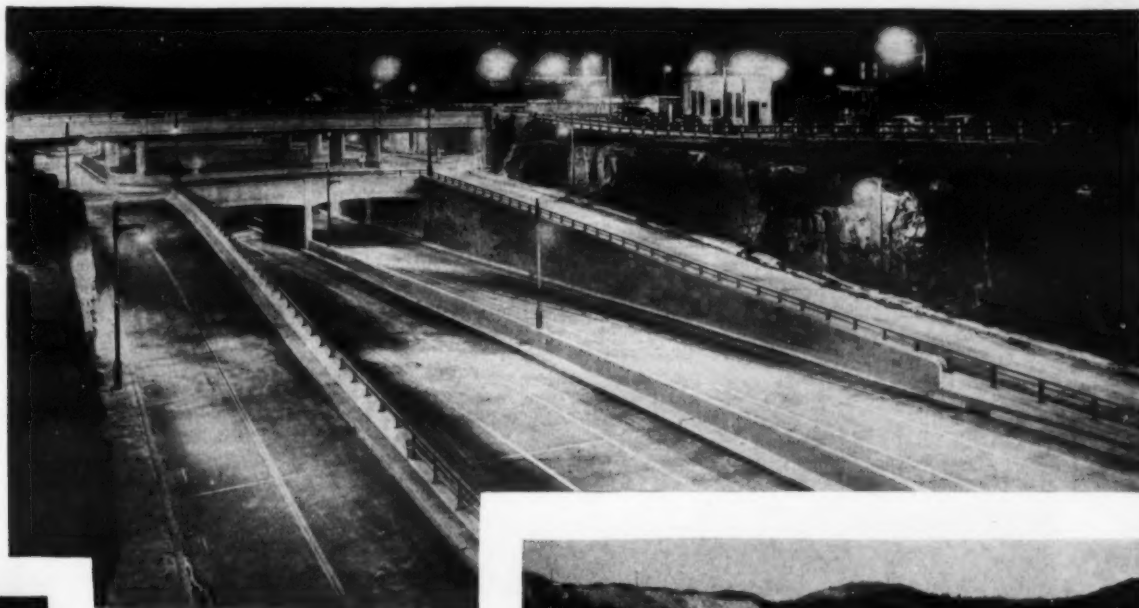
C. & E. M. Photos



A Caterpillar MD6 and LaPlant-Choate bulldozer spurs rock from the north-side cut and the earth hauled from the south side. In the north cut, Washburn's vanised corrugated metal pipe provides drainage in trench. Guy H. Lewis & Son of Lynchburg, Va., is contracted with Bramham on this \$100,000 job.



They might be but they're not. Only a typical group of students in the Mobart welding school tackling a job of arc welding on their own.



SAFETY LIGHTING. More light on the roadway and less going skywards is the result of the new G-E lighting system for the New Jersey approach to the Lincoln Tunnel which connects New York City and New Jersey.



Bureau of Reclamation Photo
CROW'S NEST. From this 460-foot high head tower at Shasta Dam radiate the seven cableways for the giant buckets which will deliver concrete to this great dam.



Bureau of Reclamation Photos

DIKE DYNAMITED at Shasta Dam site. The blast shown above started the diversion of the Sacramento River into the new channel which is shown flowing full in the photo at the left. The base of the dam, the major feature in the Central Valley Project in California, will be poured in the unwatered river bed.



ARMY AIRPORT
Construction under the National Air Defense Program is active in many states. Frank A. Somers Co.'s LaPlant-Choate Carrimor scraper and D7 tractor are grading around a new hangar at Chanute Field, Ill.



MOUNTAIN not out of a molehill, but 3,500 cubic yards of calcium-chloride-treated sand stockpiled by J. B. Cianchette & Co. of Pittsfield, Maine, who hazard-proofed 300 miles of Maine highways last winter under a maintenance contract. Other smaller piles were stocked at strategic points.

FEDERAL AID IS ELIMINATING MANY HAZARDOUS GRADE CROSSINGS



C. & E. M. Photos
Bramham excavated the south approach to the underpass in earth with a Bucyrus-Erie 10-B power shovel loading to a fleet of dump trucks which shuttled over the double-track line of the Southern Railway to the fill on the north side. Above, a Southern Railway work train approaches to unload ties and rails for the shoofty as two empty dump trucks start a dash back across the tracks.

Light-Weight Grader For Maintenance Work

Bulletin 255, recently issued by Galion Iron Works & Mfg. Co., Galion, Ohio, describes and illustrates the Galion No. 401 motor grader. According to the manufacturer, this grader is a sturdy light-weight inexpensive unit, especially designed for maintenance work in townships, counties, cities and villages. It is light in weight to insure low operating cost, yet it possesses sufficient power and blade pressure to give satisfactory results under all ordinary blading condi-

tions. An International Model IU-4 4-cylinder 31-hp gasoline engine mounted over the rear axle supplies the power, which is transmitted to the axle by means of a multiple-V belt drive.

Complete details and specifications are included in this Bulletin 255, copies of which may be obtained by those interested direct from the manufacturer.

Asphalt Heating Equipment

Catalog No. 658 recently announced by the Hauck Mfg. Co., Brooklyn, N.Y., describes and illustrates the improved

Speed-Master melting kettle with the Kwiklean feature. In addition it covers the new combination skid and trailer kettle which can be trailed to the job and then the kettle removed from the chassis by one man; the Hauck barrel hoist; kettle thermometer; hand and power spray attachments; and the Speed-Master gas-fired kettle using petroleum gas in the cylinders.

Copies of this catalog may be obtained by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

New Equipment Catalog For Ready Reference

A concise, ready-reference catalog on new, used, rebuilt and surplus stock has been issued recently by the Harnischfeger Corp., Milwaukee, Wis. The catalog, Bulletin X-5-40, lists excavators, cranes, engines, motors, hoists, and miscellaneous equipment, and gives the price, conditions and location of each item offered with all equipment indexed and arranged for quick reference.

Copies of this Bulletin may be obtained direct from the manufacturer.



USE ASPHALT TO SPEED UP YOUR NATIONAL DEFENSE HIGHWAY PROGRAM

● Tanks, trucks and planes soon will be pouring off of the production lines. Eventually a completely mechanized American army will be on the move. Good roads are as essential to a modern army as water is to the Navy. How near does your highway system measure up to the minimum standards set up for military requirements? Would a movement of troops in training through your county or state paralyze normal traffic? Will your system of secondary highways handle the heavily increased load, at high speed?

These are a few of the questions dropped into the laps of highway officials by the national defense program.

Many counties and states are already prepared to meet this need. They have planned their highway systems to

get the greatest mileage of improved, all-weather roads for their money. They've used Asphalt.

Consider these facts, whether you are planning "defense" highways or your regular program. There are many types of asphalt construction. After considering local traffic requirements, soil conditions and available aggregates, you can pick the type that is most economical for your need. Fast, safe all-weather surfaces can be laid quickly—roads or airport runways are out of service but a short time. Asphalt surfaces are easily maintained and you get the maximum mileage for your money.

Adequate stocks of all types of Asphalt are available throughout the Middle West. Write to Standard Oil Company (Indiana) 910 South Michigan Ave., Chicago.

*Asphalt for
every purpose*

STANDARD OIL COMPANY
(INDIANA)



Star-Lite link-mounted reflectors are easily made into signs.

New Type Reflectors In Form of a Chain

A new type of reflector button, link-mounted in the form of a chain, for making all kinds and sizes of reflector signs is made by the Star-Lite Co., 312 E. Market St., Indianapolis, Ind. This reflector chain is as flexible as a string, according to the manufacturer, and may easily be mounted on any surface with the aid of a screw driver or hammer as it tacks on like tape or fastens with screws to sheet metal, wood or plastic to form desired letters, symbols or numbers, even in script.

The reflectors are of a new multiple reflex type, individually moulded, returning a brilliant lustrous light at a great distance and at extremely wide angles, the manufacturer states. This company also makes a line of pavement surface markers and traffic signs, bull's-eyes and post and berm lights.

Further information may be secured direct from the manufacturer by mentioning this item, or from this magazine.

New Cab-Over-Engine 2-Ton Motor Truck

Included in the line of Dodge Job-Rated trucks is a 2-ton cab-over-engine model, made by Dodge Division, Chrysler Corp., Detroit, Mich. This 2-ton model is a companion to the Job-Rated 1½-ton cab-over-engine truck already widely used. In addition to its cab-over-engine design, the features of the new 2-ton model include an L-head Dodge truck engine with 241.5 cubic inches piston displacement and a horsepower of 99 at 3,000 rpm; exhaust valve seat inserts; full-length water jackets and water distributing tube; five-speed transmission; hypoid rear axle and booster-actuated equal pressure hydraulic brakes.

IT'S NO SECRET



THAT ROSS plows will move more snow and do it with less power than any other. They are scientifically designed and built to PLOW, not bulldoze snow. The "Sno-Flo" moldboards used on Ross plows pick up the snow and roll it.

Ross plows are furnished for truck and tractor mounting, with or without wings and to be operated with hand or power hydraulic.

Manufactured by

THE BURCH CORPORATION
Crestline, Ohio

Builders of Equipment for Fifty Years

The cab is large, well-ventilated and thoroughly insulated. From the vantage point well forward and upward, the driver has safety vision day and night. The gear shift lever is located in the standard or normal position, and a carefully designed step arrangement and full-width doors make the cab easy to get in or out of on either side.

Offered in three wheelbase lengths of 105, 129 and 159 inches, this 2-ton model has a maximum gross weight rating of 15,000 pounds in conventional use and 25,000 pounds when operated as a tractor-trailer unit.

Gasoline and Diesel- Powered Motor Graders

Grader and engine specifications, and details on standard and optional equipment on motor graders No. 412, 501 and 511 are given in leaflets recently issued by J. D. Adams Co., Indianapolis, Ind. Graders No. 412 and 511 are equipped with 66½-hp diesel engines and the No. 501 with a 66½-hp gasoline engine.

Standard equipment on all three includes 12-foot blades with end bits or boots, hydraulic wheel brakes, hand brake on transmission, and rear tires as selected.

Copies of these illustrated leaflets may be obtained from the manufacturer.

Jaw Crushers

The latest models of the Eagle jaw crushers, made by the Eagle Crusher Co., Inc., Galion, Ohio, are of modern design and are constructed of one-piece electric-welded steel plate frames, giving greater strength and reduced weight. In various sizes, these crushers are equipped with either plain self-oiling or SKF bearings.

The capacities of these Eagle jaw crushers vary from 5 to 85 tons per hour, depending on the size of material crushed. They are available with jaw openings of 10 x 16, 10 x 20, 12 x 20, 10 x 36, 15 x 36 and 18 x 36. The jaws used in these crushers are made of high manganese, reversible for double wear



An International L-12 tractor and highway mower operating along a roadside in St. Croix County, Wisconsin.

and are adjustable while in operation.

Literature giving further details on Eagle jaw crushers may be secured by interested contractors and state and county highway departments direct from the manufacturer by mentioning this magazine.

Gruen—the watch with a "reason why" for Engineers

● Thinnest popular-priced "Professional" wristwatch made, the new Gruen Veri-Thin is the smartest and most practical watch engineers have ever been offered.

The large working parts of its Gruen-pioneered, Gruen-patented Veri-Thin movement are brilliantly re-arranged so the watch can be made almost 50% thinner at sides and ends . . . without sacrifice of pocket-watch accuracy or long life. Some of the new Veri-Thin models for engineers—handsomely re-designed and with big dials, sweeping second hands—are shown below. Note particularly the "water-proof" models, sealed against moisture and dust. See them at your Gruen jeweler's today!

Gruen watches from \$24.75 to \$250; with precious stones to \$2500. Write for folder. The Gruen Watch Co., Time Hill, Cincinnati, O., U.S.A. In Canada: Toronto, Ont.

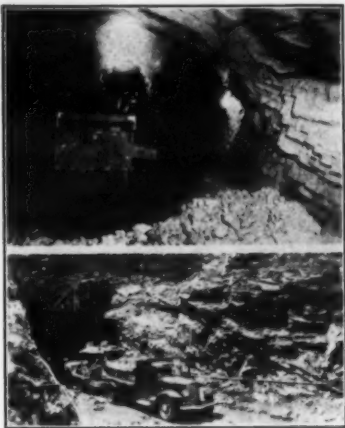


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GIFTS FROM YOUR JEWELER ARE GIFTS AT THEIR BEST!



Above, a Cletrac Hercules-diesel-powered tractor with Sargent Overhead shovel mucking in a tunnel at Indian Rock Dam, York, Pa. Below, a truck load of rock is being pushed out by the tractor.

Diesel Power Speeds Job at Indian Rock Dam

At Indian Rock Dam at York, Penna., a Cletrac diesel-powered crawler tractor with a Sargent Overhead shovel is being used for mucking out a water diversion tunnel being driven through 400 feet of rock ledge. The diameter of the tunnel, as blown, is 18 feet and each 300-pound blasting charge produces approximately 100 yards of blown rock. After the powder fumes and excess dust have been removed by the ventilating fan, the tractor with the $\frac{7}{8}$ -yard Sargent Overhead shovel mounted on it backs into the tunnel with a gasoline-powered truck towed behind the tractor. As the trucks are loaded, they are pushed out by the Cletrac diesel, as the use of gasoline engines in the tunnel is prohibited because of danger of carbon monoxide.

The Cletrac is powered by a Hercules Model DRXB diesel engine with a $4\frac{3}{8}$ x $5\frac{1}{4}$ -inch bore and stroke. Approximately $26\frac{1}{4}$ yards of material per hour is moved out of the tunnel, including pulling in the empty trucks and pushing out the loaded ones. The 4-yard trucks are loaded in 4 minutes. The Benjamin Foster Co. of Philadelphia is contractor for this work.

New Catalog Describes Pressure Distributor

Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio, has recently issued a bulletin devoted entirely to its new Spray Master pressure distributor. According to the manufacturer, the Spray Master is a modern piece of black-top equipment, embodying features that make the application of black-top materials simple, efficient, and economical. With four types of spray bars available, distributor users can secure a unit to fill every need.

Copies of this illustrated bulletin may be obtained by interested contractors and state and county highway departments direct from the manufacturer.

Manual On V-Belts

Power transmission through V-belts is presented in a very clear and interesting way in a Master Manual recently published by the Worthington Pump & Machinery Corp., Harrison, N.J. The Manual is amply illustrated with figures depicting the advantages of Worthington's quick demountable sheave, explaining why V-belts should be operated with enough tension, and contains a page of precautions. By means of diagrams, the Manual makes clear why important drives should never be underbelted, why it does not pay to use pulleys that are too small or to operate with a belt speed that is too high.

There are 72 pages in all in this Manual and copies may be obtained direct from the manufacturer.

Seepage from Canal Prevented by Lining

(Continued from page 14)

of this machine left but little hand finishing to be done on the slopes. Material placed on the side slopes was not compacted.

Other bidders on this work were said to have contemplated placing material on the slopes by gravity from the berm, or by pushing it up from the base.

Good Hauling Road Speeds Work

The trucks hauling the material made excellent time, traveling at 40 to 45 miles an hour both ways over a two-lane roadway in the bottom of the channel, which was smooth as a paved boulevard. There was no outside traffic in the way, and more than 2,350 cubic yards of material was moved in an 8-hour shift. The roadway was sprinkled with a GMC 3,000-gallon tank truck and was built and maintained with an Austin-Western 99 grader.

Personnel

An average of 110 men were employed, working two 8-hour shifts, on this canal lining contract which J. W. & E. M. Breedlove Excavating Co. brought to successful completion. One of the conspicuous features of the job was the newness of the equipment used. However, a Lincoln Stable Arc welder mounted on a Ford truck which also carried a Victor acetylene unit was on the job to take care of any necessary repairs. There were very few of these

required as it is the policy of this contractor to replace old and worn equipment frequently, to avoid any possibility of delays due to breakdowns.

Phil Breedlove was in charge of this job for the contractor. L. J. Foster is Construction Engineer in charge of the Yuma office of the Bureau of Reclamation, and J. K. Rohrer is in charge of field work on both the All-American and Gila Canals at Yuma.

Material Handling

In Industrial Plants

The Bucyrus-Erie Co., South Milwaukee, Wis., has recently issued a new bulletin explaining the advantages of crawler-type cranes over track or overhead-type cranes in the handling of heavy materials in industrial plants. Fixed rigs have proved difficult to multiply efficiently and with industry expanding there should be a demand for more flexible units. Many uses for cranes are graphically portrayed and fully described in this informative bulletin and there are data on the complete Bucyrus-Erie line of excavators and cranes.

Copies of this bulletin may be obtained by interested contractors direct from the manufacturer by mentioning this item.

County Highway Supt. Dies

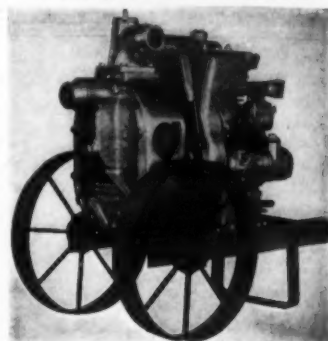
Jerome C. Hinckley, Superintendent of the Geauga County, Ohio, Highway Department, died very suddenly at his home in Burton last month. Well-known in Ohio road-building circles, he had held the position of Superintendent for 11 years.

Light-Weight Excavators

Bulletin No. 114 recently issued by the Universal Power Shovel Corp., Milwaukee, Wis., describes and illustrates the Unit 514 shovel. This shovel is an all-welded, light-weight unit, weighing only 24,000 pounds stripped for action, yet it has the brawn and power of a heavy-duty machine.

Its construction features, general specifications, and crane radius diagrams and loading charts are given in this bulletin, copies of which may be obtained direct from the manufacturer by mentioning this item.

Are You Tired of Pump Headaches?



Marlow Pumps give continuous and genuine satisfaction. Sizes $1\frac{1}{2}$ " to 10" self-priming centrifugal. Also diaphragm and plunger pumps.

Ask for Bulletin CEM-42

MARLOW PUMPS
Ridgewood New Jersey

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RED DEVIL LIGHT and POWER PLANTS 800 to 50,000 WATTS



3,000 WATT
as illustrated on
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Pneumatic Tires

Finish the job quicker and save money with electricity.

Send for catalog describing generators and our complete line of portable poles for floodlighting.

E. B. KELLEY CO., Inc.
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Long Island City, N. Y.

Direct Subway Entrance to World's Fair

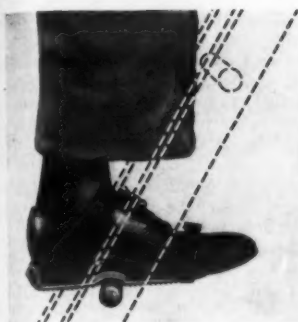
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1400 ROOMS from \$3.
Each with Bath, Servidor, and Radio. Four fine restaurants acclaimed for cuisine.

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PRESIDENT
John L. Horgan
Gen. Mgr.
HOTEL EDISON
SAME OWNERSHIP

IN THE CENTER OF MID-TOWN NEW YORK



Lad-R-Shus are a new device to make standing on a ladder both safe and comfortable.

New Non-Slip Shoe Aids Ladder Workers

Protection from the dangers of slipping and the discomforts of ladder climbing and standing is afforded to workers by the new non-slip "shoe" recently announced by Landon P. Smith, Inc., Irvington, N. J. This device, known as the Lad-R-Shu, consists of a sturdy steel plate which is held firmly against the sole of the wearer's shoe with strong leather straps. The Lad-R-Shu has a slip-proof bottom of long-wearing rubber matting and a specially designed grooved arch that grips the ladder rung securely, contributing not only to comfort and safety but to foot health as well, according to the manufacturer.

Light in weight, the Lad-R-Shu is convenient to carry and wear and easy to walk in. It is reported that its use makes long hours of standing on a ladder as safe, comfortable, and as easy on the feet and muscles of the legs and back as standing on a floor. Further information and prices may be secured direct from the manufacturer by mentioning this item.

Rock Drill Dust Control

The Markley rock drill dust control unit which collects and retains dust during rock drilling operations in quarries, rock cuts, tunnels, and similar jobs is made by the Markley Dust Control System, Inc., 306 E. 123rd St., New York City, and meets the requirements of the New York State Board of Standards and Appeals.

Machine No. 1 WD has a capacity of two 2½-inch bore drills or one 4-inch bore drill, is readily transported from one spot on the job to another, is 3 feet 4 inches wide, 5 feet 1 inch high, and 6 feet long, and has a single-gate bottom discharge so that it can be emptied while in operation without closing down the system.

Further information on this dust control system and the importance of protecting drillers against rock dust, to pre-

vent the development of silicosis, may be secured by those interested direct from the manufacturer by mentioning this item.

Lee D. Cosart Appointed Dodge Truck Sales Manager

Dodge Division, Chrysler Corp., Detroit, Mich., has announced recently the appointment of Lee D. Cosart as Sales Manager of its Truck Division, filling a vacancy created by the resignation of T. W. Moss, formerly director of Dodge truck sales. In making the announcement, Forest H. Akers, Vice President of Dodge, stated that Mr. Cosart brings to the company well-rounded experience and ability in every phase of automotive merchandising.

Mr. Cosart's first connection with the automobile business was with Dodge in 1926 where he remained in various capacities until his appointment as Plymouth Assistant Sales Manager two and one-half years ago and later as Plymouth's General Sales Manager.

Access Roads Program Announced by F.W.A.

Announcement has been made by Federal Works Administrator John M. Carmody of plans for the immediate improvement of approximately 3,000 miles of "access" roads in areas adjacent to some 120 military reservations. It is estimated that the cost of the improvements will be about \$200,000,000.

While the details of financing this work have not been settled, Mr. Carmody said that where the roads are for purely military purposes they will probably have to be financed by the Federal Government, but where the military roads are also used by the public, the states will be expected to pay a portion of the expense.

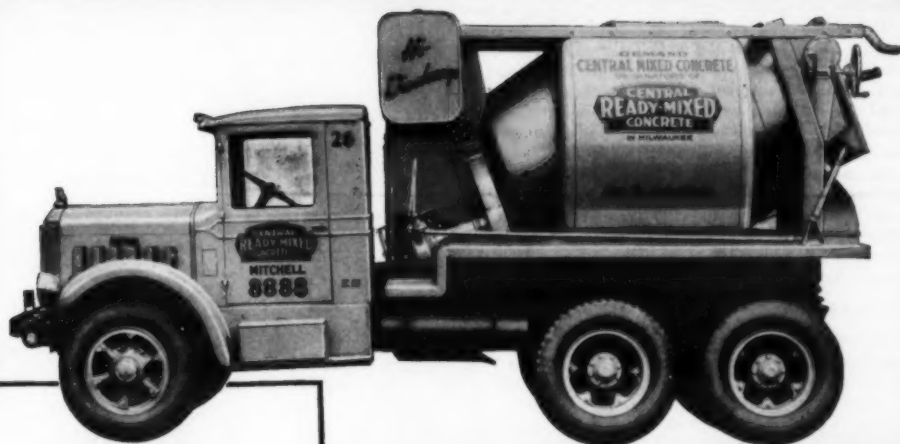
Details of the National Highway Defense Program have not been completed, but it is apparent that the W.P.A. will come in for a portion of the work. Contrary to certain public reports, however, there is no indication, according to the American Roads Builders' Asso-

ciation, that any effort is being made or that there is any proposal under consideration which is intended to alter or supplant the present administration of Federal Aid. Improvements to the Federal-Aid system will be handled as heretofore by the Public Roads Administration, and W.P.A. participation will be of a supplemental nature on roads off the Federal-Aid system, except for the possibility of using W.P.A. in a shoulder-widening program.

The 3,000-mile access-road mileage is comprised of 1,241 miles within military reservations and 1,871 miles outside of such reservations. It is anticipated that most of the work within these reservations will be done by W.P.A.

Commenting on the needed improvement of the selected 75,000 miles of roads strategically important to national defense, Administrator Carmody said that there are 1,800 rural bridges with capacities less than 30,000 pounds, 150 with vertical clearance less than 12.5 feet and 1,700 with horizontal clearance less than 18 feet wide.

Again REX MAKES TRUCK MIXER HISTORY!



NO OTHER TRUCK MIXER HAS THESE!

- 1 Quick-as-a-flash charging.
- 2 Ability to handle lower slump mixes.
- 3 New revolutionary mixing principle in the Rex "self-cleaning-while-mixing" drum.
- 4 Rex anti-freeze water system with positive injection of water into the heart of the batch for faster mixing.
- 5 The finest drive ever put on a truck mixer—the improved Rex Chabesco chain drive and Rex twin clutch transmission.

*Be Right—
Buy Rex!*



NOW! A LINE OF PROVED Hi-Discharge MOTO-MIXERS

For over eleven years Rex has led the truck mixer field in the development of faster, more efficient truck mixers! Here's the latest, the Rex Hi-Discharge Moto-Mixer, now thoroughly proved on jobs of all sizes and types.

Rex—not you—has done the experimental work!

Not just another truck mixer—the new Rex Hi-Discharge has features never before offered on any truck mixer! Study the list at the left—a list of features you've been waiting for—found solely on these great new Rex's. Built to the newly adopted standards, the Rex Hi-Discharge gives you greater payload capacity and the greatest spouting range found on any truck mixer of equal size. All this—plus the many Rex-pioneered advantages found on all Rex Moto-Mixers!

Check the list of Rex features—you will see why it pays to depend on Rex for up-to-date, lower cost ways to mix, haul and place concrete! Send for free folder, "A New Era in Truck Mixer History." Address Chain Belt Company, Dept. MM-10, 1666 W. Bruce Street, Milwaukee, Wisconsin.

CHAIN BELT COMPANY OF MILWAUKEE

Hi-Discharge MOTO-MIXERS

PILE HAMMERS and EXTRACTORS HOISTS-DERRICKS WHIRLERS

Special Equipment
Movable Bridge Machinery

Write for descriptive catalogs.

McKIERNAN-TERRY CORP.
19 Park Row, New York

Distributors in Principal Cities

Vertical Lift Bridge For South Jersey Road

**F. A. Canuso & Son Complete
Skew Lift Span Structure
Over Raccoon Creek, Route
U.S. 130 at Bridgeport, N. J.**

(Photo on page 44)

TO maintain Raccoon Creek at Bridgeport, N. J., as a "navigable stream" in accordance with War Department requirements, the New Jersey State Highway Department awarded a contract to F. A. Canuso & Son of Philadelphia, Pa., for the erection of a 93-foot lift span skewed 26 degrees 44 minutes, giving 65 feet clear at right angles to the fender racks and carrying a roadway 52 feet between curbs with a 4-foot center island. Reports from the old bridge show that there were usually two lifts a day during the spring when fertilizer was being shipped from a local factory, and about two a week for the balance of the year. The new bridge cost \$323,177.00.

The bridge consists of an east abutment with a 45-foot span to Pier 1, a span of 48 feet to Pier 2, the lift span between Piers 2 and 3, and then a span of 48 feet from Piers 3 to 4, and 45 feet from Pier 4 to the west abutment. Six-foot sidewalks are cantilevered at either side. The site of the new bridge coincides with the old bridge at the west end so that the old bridge was continued in service until the east abutment, Piers 1, 2 and 3 and the lift span were completed, and two-thirds of Pier 4 and one-half of the west abutment were finished. Then the west abutment and adjacent pier of the old truss swing bridge were dismantled, allowing traffic to use the completed portion of the new bridge, while the remaining portion of the structure was completed.

Foundations

Work was started at the east abutment, the Bethlehem sheet piling for the cofferdam being driven by a McKiernan-Terry No. 7 steam hammer swung by a Northwest crane. The cofferdams for the abutments and all of the piers averaged about 100 x 18 feet and for Piers 2, 3 and 4 were driven 25 to 30 feet below the river bed. The foundation conditions encountered were open sand at the top at the east abutment sloping down and covered with muck of gradually greater depth as the work continued across to the west abutment. The material was excavated by three Northwest

cranes with 3/4-yard Blaw-Knox buckets. The sand which was excavated was used as fill at the east abutment and the clay and muck was loaded into trucks and hauled to adjacent meadows. The excavation averaged about 20 feet deep, according to specification, to which 1 foot was added because of the material inevitably displaced by pile driving.

The timber piles were driven to penetrations varying from 20 to 45 feet to the required bearing of 20 tons by a No. 9-B-3 McKiernan-Terry steam hammer. Steam for the hammer was furnished by a pair of vertical portable boilers set up at the west abutment. The piles were cut off with a Wolf air-driven chain saw.

The contractor used as many as nine Rex and Jaeger 6-inch pumps for unwatering the cofferdams, due to bad leaks in the bottom sand. In Piers 1 and 3 a total of sixty 2 1/2-inch Moretrench wellpoints were used, pumped with a 6-inch Moretrench pump. These set just inside the cofferdam greatly reduced the amount of free water which had to be pumped.

Piers and Forms

The footings were 5 feet high x 15 feet wide and then stepped in to 11 feet wide to carry the standard piers. The forms were uniform panel forms 2 x 3 feet made of plywood with angle irons at the edges for bolting the panels together. Both wales and studs were 2 x 6-inch lumber. The forms were braced and tied with Universal form ties and Richmond Tyscrus.

Concreting by Pumpcrete

Gravel for the concrete on this job was brought in by barge, sand by truck, cement by rail and the superintendent first arrived on the job by air. A Heltzel batching plant was set up just northeast of the east abutment and the weighed batches hauled by one to three 3-batch trucks for about 1/8 mile past the end of the bridge to a Pumpcrete unit just southeast of the east abutment. An old coal yard had been located at this point so that it was possible to set the Pumpcrete in one of the depressed storage bins. The Ransome 27-E paver which mixed the concrete was set at street level



C. & E. M. Photo
The lift span of a new bridge over Raccoon Creek on its way up.

above the Pumpcrete and delivered directly to its hopper. The Pumpcrete machine operated to a maximum distance of about 300 feet horizontal and 30 feet vertical. It pumped all of the concrete for each abutment and pier from east to west on the bridge. Whenever a ship wished to pass through it was necessary to break the pipe line across the channel.

The specifications required the rubbing of the pier faces down to mean high water. This was done by hand with Carborundum block, with a few of the roughest spots being done by machine. The deck of the bridge, with the exception of the lift span, is 9-inch reinforced concrete. In order to permit maximum efficiency for the necessary night work, the cofferdams and concreting operations, where a monolithic pour was under way, were well lighted with Esso floodlights.

The Lift Span

The erection of the lift span was done under a subcontract by the American Bridge Co. and the electrical equipment

for raising the span was installed under another subcontract by the American Electric Construction Co. of Philadelphia. An auxiliary gasoline engine is installed at the top of the lift frame for use when electric power is not available. The deck of the lift span is 2 1/2-inch deep galvanized grating installed by Reliance Steel Products Co., with alternate straight bars of the grating being welded to the floor beams of the lift span.

The operator's house for the bridge is located just south of the west abutment with the remote control for all operations centered at that point. This house is supported by four 58-foot creosoted piles. The counterweights at either end of the lift span are of concrete in steel boxes, the combination weighing 130 tons for each of the two counterweights.

Personnel

The contract for the erection of the Raccoon Creek vertical-lift bridge was awarded to F. A. Canuso & Son of Philadelphia, Pa., on the low bid of \$323,177.00. For the contractor, C. Thomas was Superintendent, and C. D. Weller was Resident Engineer for the New Jersey State Highway Department, with Ralph H. Davis as Bridge Construction Inspector.

Eye and Face Protection For Welder Operators

A comprehensive catalog has recently been issued by the Sellstrom Mfg. Co., Chicago, Ill., covering its complete line of eye and face protection equipment, including welding accessories, many types of goggles for industrial workers, respirators, gloves and safety clothing. The book has 72 pages, is indexed and profusely illustrated.

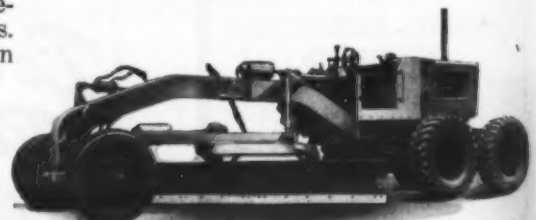
Copies of this Catalog No. 18 may be obtained by writing direct to the manufacturer and mentioning this magazine.



BETTER VISION—BETTER TRACTION

By re-designing our Junior motor grader and moving the engine back over rear axle, it is possible for the operator of this No. 401 lightweight unit to obtain better vision—better traction. Power is furnished by an International IU-4, four cylinder, 31 HP gasoline engine. Sufficient power and blade pressure to get splendid results under ordinary maintenance conditions. Send for Bulletin No. 255.

Another improved unit in the Galion line of all-purpose graders is the No. 201 (right) designed for moderate duty. Can be equipped with 50 HP diesel or 48 HP gasoline engine with single or double drive. Bulletin No. 254 goes into detail. Also heavy duty No. 101 with 80 1/2 HP diesel or 68 HP gasoline engine with double drive only. Bulletin No. 253. Send for your copy.



Why not look into the Galion line of motor graders?

The Galion Iron Works & Mfg. Co.
Main Office and Works, Galion, Ohio

**THE STRONGEST
GEARED
POWER
FOR ITS
WEIGHT
IN THE
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ALL STEEL HAND HOIST

SEATTLE, U.S.A.

COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, 1/2" cable used:

2-Ton "Lightweight"	75 ft.
5-Ton "General Utility"	350 ft.
15-Ton Triple-Geared "Special"	1200 ft.

Patent instant gear change and positive internal brake that never fails, and will lock load.

Price, f.o.b. Seattle

Gear Ratio	Weight
2-Ton 4 & 23 to 1	60 lb.
5-Ton 4 & 24 to 1	110 lb.
15-Ton 4, 19 & 100 to 1	680 lb.

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**3 1/2 E. D. LANSING
TRAILER MIXER**

This new Lansing Trailer Mixer is faster, more compact and easier handled. Its overall length is only 57" and entire width 68", with a height of 65".

It has a convenient shoveling height of only 42 1/2", with a 31-inch drum. Sturdy 17 1/2" axles, and 26" wheels with pneumatic tires. Weighs only 950 lbs. Write or wire NOW for complete information.

LANSING COMPANY
LANSING, MICHIGAN

CHICAGO NEW YORK BOSTON PHILADELPHIA
MINNEAPOLIS KANSAS CITY SAN FRANCISCO
LOS ANGELES

Sepulveda Dam

(Continued from page 11)

used for the purpose have steel platforms supported by I-beams and are equipped with steel frames to keep the buckets from slipping off. Each bucket weighs 1,800 pounds and holds 2.22 yards or 5 tons of concrete, a total weight of 6 tons.

The Koehring crane which handles these heavy loads has a 70-foot boom and a 2-yard block of concrete bolted to the rear end of the cab. Power is supplied by a 200-hp diesel engine.

Railroad Bridge

A Southern Pacific railroad line which crossed the dam site has been relocated, the new grade passing around the north side of the reservoir. A railroad bridge is being constructed across the Los Angeles River just above the reservoir. The contract for 150,000 yards of excavation and the construction of the concrete piers for this bridge was let to V. Lovrich and L. B. Konjevod, Los Angeles contractors, for \$150,000.

Concrete piers and slabs are being built for a structure 400 feet long and require 4,500 yards of concrete, including that for a nearby culvert. Concrete pouring was started on August 27, using a two-batch mixer. The government is furnishing the cement.

The piers rest upon 14,000 feet of chemically treated 30-foot fir wood piles which are being driven by E. G. Perham with a steam gravity pile driver. The piers will be protected by 16-foot steel sheet piles.

The 150,000 yards of excavation is for the purpose of enlarging the river channel above the bridge and the material excavated is being wasted. This work was subcontracted to R. W. Hampton who is using two International TD-18 diesel tractors and one 14-yard and a 12-yard LeTourneau scraper.

Two 6-inch Jaeger centrifugal pumps work night and day to keep down the water level. Wooden concrete forms were made with a Comet power saw.

John C. Douglass is superintending the bridge and excavation work. William Presser is doing the office work and did the job estimating.

Lubrication and Other Items

The Caterpillar tractors and grading equipment on the job are lubricated with five Lincoln and Alemite grease guns mounted on a Ford truck and powered by a compressor resting on the front bumper and direct-connected with the engine crankshaft which also operates a small dynamo for generating the electricity required for illuminating night work.

Tidewater track-roll 140 grease is carried in five upright 50-gallon steel drums held in place in the truck by a metal frame. A rack behind the truck bed supports a drum of gasoline and one of diesel fuel.

The grease guns force lubricant through 50-foot rubber lines at 120 pounds pressure. It takes about 10 pounds of grease to lubricate a tractor anywhere from every 8 to 24 hours, depending upon its use. Ball-bearing couplings for triggers are preferred because they turn easily and don't leak

grease. The Alemite guns never have frozen up.

A Sullivan air compressor furnishes the power for vibrating the concrete, tamping dirt and other purposes. Several portable Lincoln welders with Hercules engines and considerable acetylene equipment is also used. An Excelsior power drill and bolt-threading machine, taking material up to 2 inches in diameter, is kept busy making up some 20,000 bolts in the contractor's large machine shop. Ten portable lighting plants, each with five powerful floodlights, and numerous smaller light units illuminate night work.

Progress and Personnel

The Sepulveda Dam contract was let in December, 1939, but rains delayed beginning the work until February 23,

1940. Very rapid progress has been made since then and an increasing number of men employed, reaching a peak of nearly 500 in August. On account of conditions, the time limit for completion was changed and now is set for January 1, 1941.

On August 20, 2,000,000 yards or 50 per cent of the excavation and 50 per cent of the fill had been completed; 41,000 yards or 60 per cent of the concrete had been poured; the steel piling had been completed; 4,550,000 pounds of reinforcing steel had been used; and 32 per cent or 60,000 tons of rock paving had been placed. Also the 200,000-yard railroad subgrade had been completed.

For Jahn, Bressi & Bevanda, contractors for Sepulveda Dam, N. F. Jahn is General Manager; V. Bressi, Field Man-

ager; R. P. Downs, Superintendent; N. R. Meek, Field Engineer; and E. C. Warmbrodt, Office Manager. Charles Clapp, who superintended the work from its inception until August 17, resigned on that date.

For the U. S. Engineer Department, J. C. Morgan is Resident Engineer, and the work is under the supervision of Lt.-Col. Edwin C. Kelton, District Engineer, U. S. E. D.

Harding of A.G.C. Dies

The sudden death on October 5 of Edward J. Harding, Managing Director of the Associated General Contractors of America, with whom he had been connected for 21 years, was a great shock to the entire construction industry.

powerful DIGGERS



IN ROCK



IN SHALE



IN CLAY



IN DIRT

Write - FOR BULLETIN
DESCRIBING THE SIZE AND TYPE
OF MACHINE IN WHICH YOU ARE
PARTICULARLY INTERESTED...

**THE MARION STEAM
SHOVEL COMPANY
MARION, OHIO, U. S. A.**

MODERNIZE with

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SHOVELS • DRAGLINES • CLAMSHELLS • CRANES
PULL-SHOVELS • WALKERS from 3/4 cu. yd. to 35 cu. yds. Gasoline-Diesel-Electric

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EXPANSION
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Standard in Concrete Construction for 25 Years
ECONOMICAL and EFFICIENT

Asphalt Joint • Rubber Joint
Non-Extruding Expansion Joint
Plate Dowel Expansion Joint
Sub-grade Felt

THE PHILIP CAREY COMPANY

Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO



An expansion joint assembly with Laclede welded dowel spacers on a concrete paving job in Kentucky, for which Ellis-Kelly Co. was contractor.

Welded Dowel Spacers For Pavement Joints

Laclede welded dowel spacers for transverse expansion and contraction joints in concrete pavements consist of the distribution bars, dowel sleeves and accurate subgrade supports combined in one welded spacer in which the dowels are inserted to complete a rigid joint assembly. This assembly supports each dowel rigidly at each end with chairs of the exact height which conform to the shape of the subgrade. Thus all dowels are held parallel to each other and the pavement surface. Even where irregular subgrades are encountered, accurate dowel alignment is provided by the rigid truss-like action of the applied dowel spacers. Two right and two left dowel spacers are required for each transverse joint. The spacers slip over the end of the dowels and wires are tied across the joint from spacer to spacer to complete the assembly.

This entire joint may be rapidly assembled outside of the forms, lifted into place and staked with speed and accuracy, according to the manufacturer. An assembly table, though not absolutely necessary, is recommended for the assembly of these joints and may be easily constructed according to details furnished to the contractor by the Laclede Steel Co., St. Louis, Mo., manufacturer of these spacers.

Further information on Laclede

welded dowel spacers is contained in a bulletin illustrated with diagrams and photos of assembly and installation on jobs. Copies may be secured by those interested direct from the manufacturer by mentioning this item.

New Line of Small Air Compressors

Supplementing its line of portable and stationary air compressors, the Sullivan Machinery Co., Michigan City, Ind., has recently added a new group of compressor units in smaller sizes. This new group, known as Type Q, is applicable for garage, shop and diesel-starting service. The units are air-cooled, in single and two-stage models, and range in capacity from 2.8 to 45.7 cfm. The power required ranges from 1/2 to 10 hp, and operating pressures from 100 to 500 pounds. The smallest unit is 10 1/8 x 14 x 18 inches in size and the largest 20 3/8 x 19 1/2 x 25 1/2 inches.

Features of these Type Q compressors

include cushioned air valves, balanced crankshaft, taper roller main bearings, Lynite connecting rods, semi-steel pistons, positive lubrication, copper inter-cooler, chrome nickel cylinders and dust-proof crankcase. Automatic starting can be furnished. The units are available bare, base-mounted or tank-mounted, for V-belt drive from motor or air-cooled gasoline engines. Units for diesel starting may have a combination motor and gasoline-engine drive, so arranged that the belt can readily be shifted to the gasoline engine in case of current failure.

Another new small stationary compressor for shops or standby service is the WL-70 two-cylinder single-stage compressor with complete air cooling, built-in aftercooler, force-feed lubrication, heavy-duty ball main bearings, low-lift long-life valves, air-filter silencers on each cylinder, automatic regulation, and easy accessibility for inspections. This new compressor is available in five sizes, from 96 to 233 cfm. These WL-70 Unitairs are supplied as

complete motor-driven units on rigid steel sub-bases, direct-connected or V-belt driven; or without the sub-base and with V-belt sheave or flat belt pulley.

Copies of Bulletin A-33, describing the Type Q compressors, and of Bulletin A-34 on the WL-70 Unitair may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.



CORRUGATED METAL CULVERTS

Easily installed—no delay and no maintenance. Guaranteed to meet U. S. and State Highway Specifications.

Durable . . . Permanent . . . Low Cost

Phone or write
PENN METAL CORPORATION OF PENNA.
48 Oregon Avenue, Philadelphia, Pa.



***WE USED TO THINK
7 HOURS WAS
FAST TIME FOR THE
OAKWOOD TRIP!***

Improved gasoline has helped make yesterday's record trip today's regular schedule.

Many of the advancements in engine design which have made practical today's fast schedules and heavy payloads have depended upon improvements in fuel for their success. In particular, the rise in compression ratios, with resulting increases in power and economy, has gone hand-in-hand with the continuous rise in gasoline anti-knock quality.

This year has seen a definite acceleration in the trend toward higher anti-knock levels. The rise has been so rapid that many operators may not be aware of the opportunity it offers for cutting trip times, reducing costs per ton mile and improving performance. Extensive road tests and the practical experience of fleet engineers have shown that there are three ways in which you can take advantage of today's improved gasoline:

1. In older vehicles by installing high compression pistons or cylinder heads (as supplied by the manufacturer) when engines are overhauled or rebuilt.
2. In present vehicles, which have high compression engines, by advancing the spark as far toward maximum efficiency as the improved gasolines will permit.
3. In purchasing new equipment by investigating the compression ratios available and specifying a compression ratio high enough to take full advantage of modern gasoline.

If you have any questions about truck fuels or any special conditions under which your fleet must use them, our fleet engineers may be able to supply you with the necessary information. For just as the Ethyl research laboratories cooperate with refiners to produce better gasoline, so they cooperate with truck manufacturers and operators to help them make the most of this better gasoline.

Ethyl Gasoline Corporation, manufacturer of anti-knock fluids used by oil companies to improve gasoline.

MAY WE SEND YOU THIS FREE BOOKLET? Results of two years of road testing, covering 95,000 miles of operation, showed how operators of commercial vehicles can get more work from today's better gasoline. Details of these extensive road tests, as well as laboratory tests, have been published in a booklet which points the way toward larger payloads, faster schedules and greater mileage. This booklet

is yours for the asking. Just write to Ethyl Gasoline Corporation, Chrysler Building, New York, N.Y.

...the total distance traveled by the test vehicle was 95,000 miles, almost the equivalent of a trip four times around the earth at the Equator.



PALMER

Friction Materials
for every kind of braking



On your trucks—

Use PALMER Asbestos-Metallic Molded Friction Blocks on your heavy trucks and equipment taking blocks instead of lining. Use PALMER Molded Brake Lining (offered either in rolls or in ready-cut sets) on your light trucks.

PALMER'S 27 years' experience in the Brake Lining field assures you of the best. Complete satisfaction guaranteed.

Factory prices to you—no middleman's profit. Write today for information about how you can save up to 50% on lining costs.

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MAKE BETTER USE OF TODAY'S BETTER GASOLINE!

Virginia 7 Widened, Gets M-I-P Surface

(Continued from page 7)

ment or about 1 inch thick. Just before the trap rock was spread, the base was primed lightly with 0.1 to 0.2 gallon per square yard of RC-2 Mexpet asphalt. Then the 3/4-inch trap rock was spread by a mechanical spreader attached to the back of the trucks, dropping the material in a uniform layer 1 inch thick for one-half the width of the road. This was immediately shot with 0.7 gallon per square yard of the same asphalt and then worked with a Galion multiple-blade road planer.

As the road was 30 feet wide and as it is not crowned but rises to a peak in the center, it was thought best to road-mix the surface 10 feet wide on each side first and then to place the middle lane last by means of a specially prepared strike-off blade, having the peak (straight) crown of 1/4-inch to 1 foot made in the blade, which straddles the crown at the center line.

After the mixing was complete the material was struck off flat and allowed to cure for about 1/2 hour and then the roller with well-wet rolls went over it at once. Immediately following this a light coat of No. 12 stone grit from 3/8-inch to 10-mesh was spread over the surface in just a sufficient quantity to fill the surface voids and then rolled continuously until the mat was set up and showed no movement under the rolls. This was then allowed to cure for a short time before each 10-foot lane of the road was opened to traffic. The asphalt for this and other applications was heated to 120 to 135 degrees F. in the distributor before application.

As soon as practicable after the M-I-P surface was completed, and usually within 48 hours, a seal coat of 0.15 gallon per square yard of Mexpet asphalt was applied and choked with 5 to 10 pounds per square yard of the 3/8 to 10-mesh material applied 15 feet wide and rolled immediately. Not much excess grit was permitted in this application but just enough of the stone grits was applied to prevent traffic picking up the seal. In applying the grit, work was started with the minimum, or 5-pound treatment, and increased as the surface of the M-I-P course showed ability to take up the material. This seal coat was allowed to set for about half an hour after rolling before opening to traffic as a completed roadway.

Major Quantities

The major quantities as estimated for



C. & E. M. Photo

One of the cuts on Virginia Route 7 which was recently regraded and surfaced, where the grade was lowered 4 feet and the slopes recut and rounded.

this project, and which were increased as much as 50 per cent in some items as the work progressed, were:

Item	Quantities
Regular excavation, unclassified	41,395 cubic yards
Class A concrete	49 "
Reinforcing steel	4,307 pounds
(The two items above were for a 72-foot culvert 4 x 4 feet in section.)	
15-inch plain concrete pipe	974 feet
18-inch " " "	132 "
24-inch " " "	99 "
12-inch " " "	504 "
30-inch " " "	75 "
15-inch corrugated metal pipe	21 "
18-inch " " "	45 "
6-inch concrete pipe laid in French drain for diagonal and cross sub-drainage	2,944 "
8-inch and variable waterbound-macadam base on secondary roads at intersections	3,507 square yards
Waterbound-macadam base	49,335 "
Covering material	117 tons
RCMA binder for use on secondary connections, a plain 60-pound surface treatment	1,933 gallons
RTA, for tar prime	17,747 "
RCMA, road-mix asphalt	49,335 "
Covering material, grit	2,467 tons

Personnel

This Federal-Aid Project-514-HI for 2.9 miles of waterbound-macadam with mixed-in-place surface was awarded to Blackwell Engineering & Construction Co. of Warrenton, Va., on its original bid of \$93,410.00. For the contractor, J. S. McCannless, one of the owners of the contracting organization, acted as Superintendent. For the Virginia State Highway Department, W. W. Sanders was Resident Engineer, and E. J. Wickre, Junior Highway Engineer, was Inspector.

New Plywood Plant

Announcement was made recently by the Oregon Plywood Corp. of incorporation for \$250,000 for the purpose of constructing a modern plywood plant at Sweet Home, Oregon. Officers of the corporation include Franklin A. Hofheins, President; Robert F. Hofheins, Treasurer; and Earl W. Leshner, Secretary. A site of approximately 35 acres has been acquired, including a log pond capable of storing 5,000,000 feet of logs and exclusive water rights insuring adequate water supply at all times. The plant will have an annual capacity of

approximately 50,000,000 feet and will be one of the most modern plywood plants on the Pacific Coast. The offices of the President and Treasurer are at 28 Church St., Buffalo, N.Y., and of the Secretary at Sweet Home, Ore.

New Wire Rope Clip

A new wire rope clip which the manufacturer states provided a 20 to 30 per cent increase in holding power and a marked lessening of rope distortion in competitive laboratory tests has recently been put on the market by the Thomas Laughlin Co., Portland, Maine. Ease of application and savings in rope are features claimed for this new safety clip.

This new product does not materially modify the fundamentals of clip design which have long prevailed in the industry but has one or two different features, including the fact that bolts and identical bearing surfaces on opposite sides equalize the pressure on the rope.

A new bulletin on this Laughlin safety clip may be secured by those interested direct from the manufacturer.

New Catalog on Engines

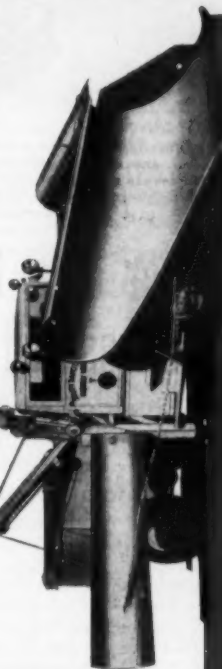
Minneapolis-Moline Power Implement Co., Minneapolis, Minn., has recently issued an illustrated catalog describing in detail its eleven different sizes of MM Twin City power units and their many applications. All of these units burn natural gas, butane, distillate and gasoline and each engine may be readily changed in the field to burn any other fuel with a minimum number of parts and at a low cost, according to the manufacturer. Specifications for power output with various fuels are included in this catalog as well as engine selection data and power curves, and details of construction.

Copies may be secured by those interested direct from the manufacturer by mentioning this magazine.

AMERICAN HOIST & DERRICK CO.

NEW YORK SAINT PAUL MINN. CHICAGO

AMERICAN TERRY DERRICK CO.



WHAT THE WELL DRESSED HIGHWAY TRUCK WILL WEAR THIS WINTER
AMERICAN VEE PLOWS-MOULDBOARD PLOWS-WINGS-HITCHES

No one type of snow plow is suitable for all snow conditions. AMERICAN Truck Hitches — Underbody and Front End types — will take both AMERICAN Vee and Mouldboard Plows without any changes being necessary in hitch or plow connections. Save time; save money. Every highway truck should be a complete snow fighting unit equipped with an AMERICAN Vee Plow. Mouldboard Plow, Wing and Universal Hitch. This arm it against winter's worst and insures that highways will be kept open at minimum cost. Write for catalog SNF-5, just off the press.



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TURNING TO SIMPLICITY ASPHALT PLANTS
NOT JUST ANOTHER PLANT—AN ECONOMIC NECESSITY

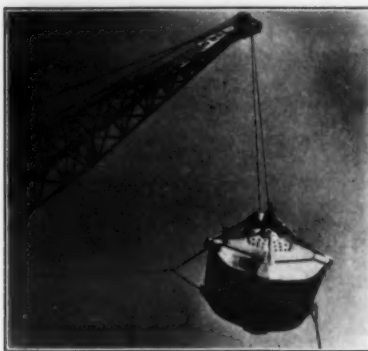


IN ONE WEEK THREE LEADING
CONTRACTORS IN OHIO AND
TEXAS HAVE BOUGHT THEIR FIRST
SIMPLICITY PLANTS—A GROWING
LIST OF PLANT OWNERS TELLS
OUR STORY

THE **SIMPLICITY**
SYSTEM COMPANY

CHATTANOOGA, TENNESSEE





American Cable Div. Photo

Some clamshell buckets employ critical diameter sheaves and involve the wire rope in severe reverse bends. Under such conditions preformed rope will ordinarily give longer service.

Longer Life for Sheaves and Rope

Hard-Surfacing Sheaves Increases Life; Use of Preformed Rope and Good Operators Important

By F. L. SPANGLER

† THE operation of clamshell cranes was considerably improved, and the length of service of the individual ropes and sheaves increased, by a large company who used the simple expedient of changing from non-preformed to preformed rope and applying a surface of high-carbon steel to the sheaves.

This company has now used preformed ropes for 3 years for holding and closing lines, and finds that these ropes give about 50 per cent greater service than non-preformed ropes, due solely to the type of rope, the company states, since operating conditions are not noticeably different from what they were in former years.

Hard-Surfacing Sheave Grooves

Sheaves are now lasting four or five times as long as formerly, because of metal-spraying the sheave groove with wear-resisting steel. In this operation, the worn groove is blasted with steel grit or sharp sand, and then a thin coat of high-carbon steel is sprayed into the blasted surface of the groove by means of a gun that atomizes a high-carbon-steel wire in an oxyacetylene flame and blows the atomized steel particles onto the prepared surface of the groove. The groove is then turned in a lathe to its correct dimensions and contour.

Sheaves having their grooves hard-surfaced with this treatment have an average life of 4 to 5 years, says this company, compared with an average life of about one year for the unsurfaced cast-iron sheave. The hard-surfaced groove is in no way damaging to the rope.

In applying metal spray, it is important that the surface of the base metal be properly prepared by blasting before spraying is started, and the prepared surface must be kept clean of oil and dirt. Without this careful surface preparation, the sprayed coating is likely to fail in service. Only experienced operators should be entrusted with this work.

Increasing Rope Life

Of the six cranes used by this company, two have 60-foot booms and handle buckets of 5-cubic yard capacity; one has a 55-foot boom with a 4-cubic yard bucket; one a 50-foot boom with a 3-cubic yard bucket; while the two smallest cranes have 45-foot booms and 2½-cubic yard buckets.

The fact that these cranes have various lengths of booms has contributed to a novel method of using up old closing and holding ropes. As the damaged ends

of these ropes are cut off, the remaining lengths can often be installed on one of the cranes of shorter boom length. A rope thus may be used on two, three, or four different cranes.

All cranes, except the two having 45-foot booms, are equipped with ¾-inch 6 x 19 hemp-center improved plow-steel preformed rope for holding and closing, and with ½-inch rope of similar grade and construction for the boom. On the two 45-foot boom cranes, the holding and closing ropes are cut from boom cables that have been used on the larger cranes.

Tag line service has also been increased by installing sufficient length to permit cropping the end of the line when it has become damaged from service. The most severe damage occurs from the bucket to and around the small idler sheave on the boom, a length of about 20 feet. The rope is provided with an excess length of 20 feet or more, which is doubled back on the line at the counterweight end. When the damaged part of the line is cropped off at the bucket end, it is compensated for by letting out the extra rope at the counterweight end.

Operator Too Is Important

The operator of a crane is an important factor in the length of rope life. A good operator so spots his crane as to eliminate side pull on the ropes, and picks up the load and swings the crane smoothly, without jerking. Also, he does not make the closing line do the lifting which the holding line is intended to do. By catching the holding line at the proper time, he brings it into tension so it takes its full share of the load.

Too much slack in the holding or closing line will severely damage this line if it jumps the sheave or is thrown out of its position on the drum. The rope in time seats itself into grooves which it forms on the drum. When a rope becomes slack and is thrown out of its proper groove, and tension is then applied, the rope is likely to be damaged where it crosses the sharp ridges between the grooves.

The improved performance of preformed rope is attributed by this company to the rope's high resistance to metallic fatigue. When ropes work constantly over drums and sheaves of small diameter, fatigue sooner or later makes its appearance in the form of broken crown wires in the rope. In the manufacture of preformed rope, the strands

are preshaped to the exact helical curve they assume in the finished rope. This preshaping process largely eliminates the locked-up stresses inherent in non-preformed rope, thereby reducing metallic fatigue and making the rope more flexible and limber so it bends and unbends with greater ease.

Loader for Highway Jobs

J. A. Schinck & Son, Meadow Grove, Nebraska, has available a folder describing its tractor loader. It is built of heavy steel to withstand hard use and is equipped with a scoop 60 inches wide having an average load capacity of ¾ yard. According to the manufacturer, contractors using this machine to load sand, gravel and dirt have reported 30 to 50 cubic yards loaded in one hour.

Further information on this mechanical loader may be obtained by writing direct to the manufacturer by mentioning this magazine.

Marmon-Herrington Expands For National Defense Needs

In preparation for the part which the Government has asked it to play in the national defense program as well as to meet the increasing demands for its products for commercial use, the Marmon-Herrington Co., Inc., Indianapolis, Ind., manufacturer of all-wheel-drive motor vehicles, track-laying tractors and combat tanks, has doubled the size of its factory.

The new buildings include an extension to the main assembly plant to double its present capacity, the erection of an additional new building, the construction of a spur track from the Belt Railroad into the plant to provide 300 feet of loading docks, and the complete modernization of the boiler house. Plans for the enlargement were developed by the H. K. Ferguson Co., Engineers, of Cleveland, Ohio, who also supervised the construction.

Earthmoving Takes Wings



... with THE TOURNAPULL METHOD

Tournapulls take up where tractors leave off—operate with job-proved LeTourneau Carryall Scrapers, specially designed for Tournapull operation—travel at speeds that enable you to stretch the profits of scraper operation to long-haul earthmoving.

Speed of a Truck, Pull of a Tractor

Tournapulls get heaping loads quickly with a pusher, haul those loads at truck speeds, spread on the fill in even layers like any LeTourneau Carryall. You save money

because there's no need for costly loading or spreading equipment. You save time because there's no waiting in line for a shovel. One fast-moving, self-propelled unit—the Tournapull loads, hauls and spreads.

Investigate this new money-making method of moving earth on long hauls. No other method available today moves so much yardage so fast and cheaply. Ask your LeTourneau "Caterpillar" dealer about Tournapulls NOW!

(Top) One of 4 C Tournapulls improving Des Moines, Ia., airport. The 4 rigs moved 200 loads of 7 pay yards or better on 4000' round trips in 5 hours, 40 minutes.

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PEORIA, ILLINOIS • STATION, INDIANAPOLIS

ASPHALT MIXING PLANTS



H & B—Stationary and portable mixing plants are designed and built to turn out maximum tonnage at minimum cost. These plants are available with batch capacities of 350 to 8000 pounds and are engineered to meet your individual requirements. Manufacturing is centralized in our own shops and each plant is completely assembled in our yard before shipment is made.

Descriptive literature sent upon request.

HETHERINGTON & BERNER INC.
ENGINEERS, PLANT MANUFACTURERS
701-745 KENTUCKY AVENUE • INDIANAPOLIS, INDIANA



One of the new Rex Moto-Mixers.

New Truck Mixers Feature Larger Size

The complete new line of Rex Moto-Mixers and Moto-Agitators recently announced by the Chain Belt Co., 1666 W. Bruce St., Milwaukee, Wis., is designed specifically to make the most of the increased carrying capacity of modern high speed trucks and accordingly these new units promote faster loading and mixing and greater carrying capacity.

The new Rex Moto-Mixer drums have shorter overall lengths but larger drum diameters so that payloads are increased, although the unit is able to negotiate city streets or unimproved roads faster and easier, according to the manufacturer. Another feature of these mixers is the new no-leak discharge door which maintains true alignment with the drum at all times. It is operated from the mixer or from the ground by a non-creeper hand wheel.

To eliminate the need for stopping the drum to change gears, the new Moto-Mixers are equipped with the Rex twin clutch transmission wherein one lever controls all speeds. Optional, at slightly higher cost, are the Rex pneumatic controls which give the driver finger-touch control of drive speeds from his seat in the cab.

The new sizes include the 2-yard Moto-Mixer with a capacity of 104 cubic feet; the 3-yard with a capacity of 156 cubic feet; the 4-yard unit with a 208-cubic foot capacity; the 5-yard with a 250-cubic foot capacity, and the Rex Metropolitan Special with a capacity of 270 cubic feet.

Further details on these new Moto-Mixers and Moto-Agitators may be secured direct from the manufacturer or from this magazine.

Tractor Excavators Have New Features

The current models of the Marvel tractor shovels, cranes and backfillers, made by Marvel Equipment Manufacturers, 224 So. Michigan Ave., Chicago, Ill., have a number of new features and improvements. They are heavier than previous models, having a 13-pound plus per foot ship and car channel in the main frame and a specially constructed shovel boom of the same material in boxed form, electrically welded throughout.

The digging thrust heretofore taken on the upright front frame over the front axle has been removed from that point and by an especially designed block and bumper, together with a change in the design of the front uprights, the thrust is now taken wholly on the rear axle. This new arrangement permits digging several inches below ground level and to a height of 3 feet above the ground surface.

The shovel drive control has been redesigned, using the well-known MB heavy-duty gear case equipped with five roller and ball bearings; the cross or cable drum shaft travels in two heavy-duty self-aligning Fafnir bearings; and in addition the main drive shaft, which has been shortened, operates at different points in four Fafnir bearings. All fourteen bearings throughout the construction are packed and sealed. A new heavy-duty positive-acting Marvel designed clutch and brake combination has been installed and a more simple pintle

or shovel boom sliding box, of fewer parts but of a more sturdy design, controls the movement of the shovel or bucket. The driving pinions are of steel, cut by gear specialists, and give perfect alignment with the double drive chain, according to the manufacturer. Each pinion is protected on its shaft with Fafnir bearings. The entire structure has been strengthened and increased in weight by approximately 200 pounds.

Literature describing these Marvel tractor shovels, cranes and backfillers may be secured direct from the manufacturer by mentioning this magazine.

C-P Appointments

Announcement has been made by the Chicago Pneumatic Tool Co., New York City, of the appointment of P. J. Christy as Manager of its Philadelphia office to succeed A. M. Brown who has become Manager of the newly opened branch in Washington, D. C. Another appointment is that of C. A. Diehl as Manager of the Houston, Texas, office.

New Sinking Drill

The new Gardner-Denver S-33 31-pound sinking drill is designed to combine light weight with the speed and power ordinarily associated with heavier drills, and is particularly suited to close-quarter work where excessive weight is a handicap. The S-33 may be easily held in any position for chute blasting, plugging and hitch-cutting.

Its power and speed are provided by the four-pawl rotation. The pawls are reversible for double wear and a special spring eliminates the necessity of pawl plungers. These springs are conical, wound from flat spring stock and, unlike wire coil springs, can not wear themselves out within the rifle bar, the manufacturer states. The exhaust control valve, when closed, diverts live air at full line pressure to clean the bottom of the hole.

Additional information will be found in Bulletin S-33, copies of which may be secured direct from the Gardner-Denver Co., Quincy, Ill.

ON BIG CONCRETE JOBS
THEY'RE SAYING—

**"tie faster with
Richmond Ties"**

Connecticut Valley's
DIKES AND FLOOD WALLS

and Santee Cooper's
PINOPOLIS DAM

were Richmond-Tied

See "Sweet's" 3-51.



RICHMOND SCREW
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838 Liberty Ave.,
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**Buckeye
ROAD-
WIDENERS**

cut costs, speed up jobs!

... A mile or more of subgrade trench per day with one machine!

WITH Buckeye Road Widening Machines you can dig a clean, true subgrade trench of uniform width and depth at a cost way below inefficient hand digging and at a speed way in excess of it. These easily operated, ruggedly built machines are comparable in quality and efficiency to all the well-known Buckeye Trenching Machines. Built in two models, they will handle any widening job. Model 16-R—mounted on 1½-ton Ford or Chevrolet chassis, digs trenches

12 to 27 inches wide. Model 16-R-4 can be mounted on new or used trucks of 3 tons capacity or more—digs trenches 12 to 48 inches wide. Wider trenches can be dug by taking more than one cut.

Digging assembly swings in back of truck for transportation, and may be completely removed if truck is needed for other purposes. For faster, better, lower cost road widening, put a Buckeye on your next job. Write for literature now.

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

**BUILT
BY**

Buckeye



Convertible shovels



Trenchers ...



Tractor Equipment



R. B. Finegraders



Road Wideners ...



Spreaders ...



C. & E. M. Photo
When a long line of loaded batch trucks is kept waiting like this, hauling costs go up and profits go down.

Careful Determination Of Hauling Costs Pays

(Continued from page 9)

material hauled per hour may be determined by Formula 1.

$$\text{Formula 1.} \\ \text{Tons Hauled Per Hour} = \frac{\left(\frac{\text{Truck Capacity in Tons (Payload)}}{2 \times \text{Haul Dist. in Miles} + \text{Time Constant in Min.}} \right) \times \text{Speed in MPH}}{60}$$

This formula takes into consideration the following factors which affect production rates:

1. Haul distance.
2. Average speed of the hauling unit.
3. "Time constant," which is the time consumed by the necessary operations of loading, dumping, turning, backing, manipulating through the loading plant, etc., and the unavoidable minor delays which supervision cannot be expected to eliminate. The sum of the "time constant" and traveling time equal the resulting round-trip time.
4. "P." The utilization of available working time. The available working time is the normal number of hours per day that are designated for work. "P" is expressed as a percentage of this available working time. It is an estimate of the percentage of the working day that the hauling equipment will be producing and represents the accumulated total round-trip time.

Formula 1 serves a dual purpose. It enters into the determination of unit hauling costs and can also be used to determine the number of hauling units that are necessary to service the major or key equipment, such as the concrete paver on a concrete paving project. As an example, if the concrete paver produces 48 batches or 96 tons of concrete per hour, and a hauling unit, under the particular set of conditions, can deliver 12 tons or 6 batches per hour, as determined by Formula 1, eight such hauling units will be necessary to serve the concrete paver properly.

The cost of hauling per ton can be determined by Formula 2 which utilizes the total cost of owning and operating the hauling unit per unit of time as contained in Table 1 and the production in tons per hour as determined by Formula 1.

$$\text{Formula 2.} \\ \text{Cost Per Ton} = \frac{\text{Total cost per hour of owning and operating hauling unit (Table 1)}}{\text{Total per hour (Formula 1)}}$$

Table 2 contains estimates of production rates determined by Formula 1 and resulting unit hauling costs determined by Formula 2 for certain values of haul distance, hauling speed, total time constant and utilization of available working time "P." It shows the effect on the unit hauling costs of variations in the values of these factors.

Reducing Hauling Costs

Reducing unit hauling costs on a project tends to increase job margin or profit. The total cost for a hauling unit

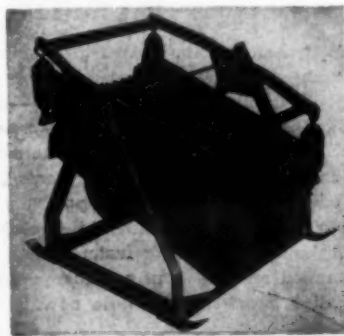
TABLE 1. ESTIMATED COST OF OWNING AND OPERATING HAULING EQUIPMENT PER UNIT OF TIME

Rated Capacity of Truck	Average Annual Ownership Expense for Fixed Items as a Percentage of Capital Investment					Estimated Average Use per Year During Life	Expense per Working Month	Application of Fixed Item Expense to Equipment Cost		Cost of Fixed Items Plus Job Overhauling, Repairs, Tires, etc.			Cost of Driver and Operator per Working Day	Total Cost of Owning and Operating Hauling Unit	
	Depreciation	Insurance, Taxes, Licenses, Storage, etc.	Shop Overhauling, Major Repairs, etc.	Shop Overhauling, Minor Repairs, etc.	Total Ownership Expense			Cost	Expense per Working Month	Estimated Cost of Job Overhauling, Repairs, Tires, etc. per Working Month	Per Working Month 9 + 10	Per Day Based on 20 Working Days per Month		Per Working Day 12 + 13 + 14	Per Hour Based on 8-Hour Day
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Tons	Per Cent	Per Cent	Per Cent	Per Cent	Months	Per Cent	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
3 1/2	18	5	3	26	10	2.6	4,400	114.40	70.00	184.40	9.22	5.50	4.50	19.22	2.40

is a reasonably fixed amount per working day. That part of this total cost which is "ownership expense" is not materially affected by the work done. This is also true of the cost for the operator and other labor which is usually a stipulated amount per day. The cost for job overhauling, replacements, repairs, tires, etc., and the cost for fuel, oil, grease, etc., can be expected to increase with increased utilization of available working time and resulting increased production during the working day. Any increase in these costs can be expected to be less than in direct proportion to the increase in production for the ranges in efficiency or percentage utilization of available working time found on work of this kind. It can therefore be assumed that the total cost per working day for owning and operating a hauling unit is a reasonably fixed amount, regardless of production, within the ordinary limits encountered; and that the unit hauling cost decreases as production is increased.

An attempt will be made in the following discussion of the factors which are contained in Formula 1 and which affect production rates to show how production may be increased.

1. **Haul Distance.** On the average project it is not usually possible for the contractor to make any material reduction in the haul distances. There is usually little choice in plant sites. The elimination of all unnecessary detours and the laying out of the loading plant so as to reduce distances between servicing points will help. The extent to which haul distances affect production rates and unit hauling costs can be gathered from Table 2 which shows that an increase in the haul distance from 4 to 8 miles, other conditions being the same, increases the unit hauling cost 76 per cent.



THIS PORTABLE VIBRATING SCREEN

accurately separates 3 sizes of 100 tons of material per day. Uses only the power of 2-hp. gas engine or 1-hp. electric motor. Self-contained, easily moved. Ideal for road and construction work, concrete block making and in small quarries and factories. Available through your local equipment distributor.

Send for
"CONTRACTOR'S
SCREEN"
Bulletin 110

ROBINS

ROBINS CONVEYING BELT COMPANY

Passaic,

New Jersey

Offices in principal cities.

TABLE 2. HAULING EQUIPMENT PRODUCTION AND RESULTING UNIT HAULING COSTS.
Rated capacity of truck = 3.5 tons Pay load = 5.25 tons Cost per hour (from table 1) = \$2.40

Haul Distance	Average Hauling Speed	Total Time Constant per Trip	Utilization of Available Working Time "P"	Production	Unit Cost per Ton	Increase in Unit Hauling Cost	
						(Per Cent)	Cause
(Miles)	(Miles per hr.)	(Minutes)	(Per Cent)	(Tons per hr.)	(Dollars)		
4	30	5	90	13.50	\$0.178		
(8)	30	5	90	7.66	0.313	76	Increase in haul distance from 4 to 8 miles.
4	(15)	5	90	7.67	0.313	76	Decrease in hauling speed from 30 to 15 miles.
4	30	(20)	90	7.88	0.305	71	Increase in total time constant from 5 to 20 minutes.
4	30	5	(50)	7.50	0.320	80	Decrease in utilization of available working time "P" from 90 to 50 per cent.

2. **Average Hauling Speed.** A maximum average hauling speed consistent with safety and with the design of the

equipment unit is desirable. In order to obtain this speed it is necessary that

(Concluded on next page)

Continental Air Conditioning Power Units

Continental AF-162 Air Conditioning Power Unit (natural gas fuel) driving Hilger 20 ton compressor to air condition Jules Restaurant, 814 West 71st Street, Chicago.

INSTALLATION BY XL REFRIGERATING CO., 1834 WEST 99TH STREET, CHICAGO.

Continental Red Seal Power Units for air conditioning have full automatic control, heat exchanger and automatic clutch. • The automatic control consists of switches, time elements, junction box and signals. • The heat exchanger cools engine by using compressor cooling water or regular water system. • Automatic clutch permits engine to start without load and then pick it up at predetermined engine speed. When operating speed is attained the engine driven governor takes over control of engine speed. These dependable and economical Red Seal Power Units are exceptionally quiet and are fully recommended for home, office, factory or refrigeration plant.

Continental Motors Corporation
MUSKEGON, MICHIGAN



C. & E. M. Photo

utilization of available working time is an important factor in keeping hauling costs to a minimum. Breakdowns such as this are expensive.

Breakdowns, Delays Boost Hauling Costs

(Continued from preceding page)

the hauling road be maintained in proper condition. Hauling roads that are rough reduce hauling speeds and increase the cost of repairs, fuel, etc. Proper maintenance of the hauling road is an item deserving consideration. Increasing the hauling speed, within the limits dictated by safety and equipment design, decreases unit hauling costs. Table 2 shows that a decrease in the average hauling speed from 30 to 15 miles per hour increases the unit hauling cost 76 per cent.

3. **Total Time Constant.** It is essential that the time constant be kept as low as possible. Reducing the time constant reduces round-trip time and increases production. The loading time can be kept at a minimum by proper selection and operation of the loading equipment. The time consumed in turning and backing at the plant can be reduced and possibly eliminated altogether by adequate planning in laying out the plant and arranging the loading equipment. The time for turning and backing at the site of paving can also be reduced by providing adequate turning space and reducing the backing distance as much as possible. The dumping time may also be reduced. The small unavoidable delays per trip for such causes as waiting to receive or to dump load, etc., should also be kept at a minimum. A reduction in the total time constant results in a reduction in the unit hauling cost. Table 2 shows that an increase in the total time constant per trip from 5 to 20 minutes increases the hauling cost 71 per cent.

4. **Utilization of Available Working Time.** "P." This represents the percentage of the working day or hour that the hauling unit is either traveling or performing one of the necessary operations of loading, dumping, turning, backing, etc. It is regulated by the reliability of the equipment and the degree of supervision exercised over its operation. Broken-down equipment and equipment that is standing idle due to unnecessary delays is not productive. The selection of reliable equipment and the operation of it in such a way as to eliminate unnecessary delays will increase the percentage utilization of available working time and reduce unit hauling costs. Table 2 shows that a decrease in the utilization of available working time from 90 to 50 per cent increases the hauling cost 80 per cent.

Data similar to that contained in Table 2 can be determined by the individual contractor by substituting the values of the factors which affect production and costs which are peculiar to his own hauling equipment, particular problems, and project conditions.

P&H Revises Canadian Sales

Announcement has been made by the Harnischfeger Corp., Milwaukee, Wis., manufacturer of excavators, cranes, hoists and welding equipment, of a re-arrangement in the supervision of its

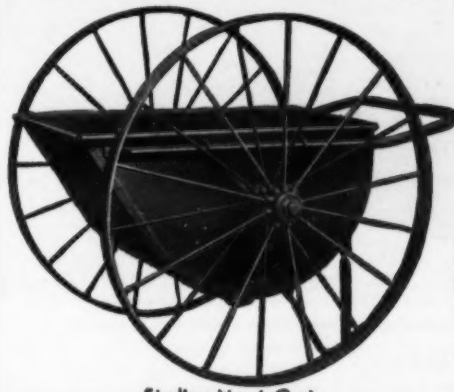
Canadian business. Henceforth, all matters pertaining to all of Canada will be supervised by Deane S. Holt of the company's Export Division, with the exception of the provinces of British Columbia and Alberta, which will remain under the jurisdiction of the Harnischfeger Seattle office.

60 Years of Progress

The Tuthill Spring Co., 760 W. Polk Street, Chicago, Ill., has recently issued an interesting catalog as an announcement of its sixtieth anniversary. The illustrations range from photographs of delivery wagons and carriages equipped with Tuthill springs to modern motor cars and trucks. There are photographs showing the executive and sales staff of the Tuthill organization and descriptive data on other items in its line, including Tuthill highway guard rail.

Those interested may obtain a copy of this catalog by writing direct to the company and mentioning this magazine.

STERLING No. 6 CONCRETE CART



Sterling No. 6 Cart

6 cu. ft. capacity
42" dia. wheels
12 gauge tray
Malleable Trunnions
With Plain or Roller
Bearings

A COMPLETE LINE
OF STERLING
WHEELBARROWS
AND CONCRETE
CARTS

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

**DRILLING THROUGH
51 MILES OF ROCK
WRINGING EVERY PENNY
FROM THE DOLLAR**

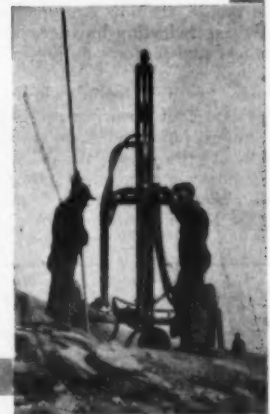
On the Escondido to Lake Henshaw Highway Project in California, a Gardner-Denver Portable Water-Cooled Compressor—supplying air to a wagon drill—was used in drilling 30,000 nine-foot holes, the equivalent of 51 miles, through hard rock. Working for Cannon Brothers of Compton, California, this equipment averaged twenty-one holes per eight-hour shift. The compressor has given low-cost operation in nearly four years of service.

When there is much work to be done—and little time to do it—choose Gardner-Denver Water-Cooled Portable Compressors for the job. These compressors—with cylinders completely surrounded by water jackets—assure you of a constant supply of air for pneumatic tools—low-cost air in any weather, at any altitude.

The low-cost, dependable performance of Gardner-Denver portables can put profits in your jobs, too—just as it is doing for so many contractors throughout the country. Complete information is yours for the asking. Gardner-Denver Co., Quincy, Illinois.

SPEED YOUR JOBS IN ROUGH COUNTRY with Gardner-Denver Wagon Drills

The Gardner-Denver U.M.-99 Wagon Drill is an ideal solution where frequent moves in rough country are necessary. Adjustable for down holes, toe holes or line drilling—can be easily moved from one location to another.



GARDNER-DENVER

SINCE
1859



The Rosco Streamliner bituminous distributor.

Rotary Control Valve Distributor Feature

One of the features of the Rosco Streamliner bituminous distributor for all types of road oils, asphalts, tar products and emulsions is the seven-way one-lever valve with a built-in automatic by-pass relief, mounted in front of the tank, which controls loading, circulating, spraying, reverse suction and regulates pressure.

Other features include the shifting, lifting and folding spraybar; patented cut-off valve at the pivot points of the spraybar; positive and instant reverse suction to prevent spraybar drip; rising stem nozzles to insure quick and clean cut-off; and accurate application to the "fogging" point. This Rosco Streamliner is designed for mounting on any truck or trailer chassis, and is made in shorter lengths for mounting on short wheelbase trucks if desired. All controls are mounted on the rear platform, or the unit can be furnished with one-man air-operated cab controls. No change of engine or pump speed is required for its operation, as the entire application is controlled through the patented seven-way valve. Pressure from 0 to 50 pounds is under the instant control of the operator. Ample doors and openings in all housings provide ready accessibility, and there is a large man-hole with a weather-tight cover to provide quick opening of the tank.

Literature describing and illustrating many sizes and styles of mounting of the Rosco Streamliner may be secured by interested contractors and state and county highway engineers direct from the Rosco Mfg. Co., 3128-38 Snelling Ave., Minneapolis, Minn.

New Diaphragm Pump

The Barnes open or closed diaphragm pump, made by the Barnes Mfg. Co., Mansfield, Ohio, has a suction lift of 25 feet and a total head of 50 feet. Water can be discharged at the spout or away from the pump. These pumps are now equipped with a single gear reduction having a herringbone gear and pinion running in an oil bath.

Other features include bronze replaceable shell bearings; integrally cast pump jack and base to assure permanent alignment of all working parts; heavy forged steel crankshaft; readily accessible valves; a patented mud ejector; and the diaphragm can

be changed in less than 10 minutes. Models B-305 and B-402 are equipped with a Briggs & Stratton air-cooled engine; Models S-305 and S-402 have a Stover hopper-cooled engine; Model L-403 is equipped with a LeRoi radiator-cooled engine, and Model W-103 with a Wisconsin air-cooled engine.

Further information on these units, which are available on 2 or 4-wheel steel trucks, or spring-mounted 2-wheel trailers with solid rubber or pneumatic tires, is contained in Bulletin 20H, copies of which may be secured direct from the manufacturer.

New Catalog on Clutches

The Fawick-General Airflex clutch, according to the manufacturer, is built on an entirely new principle, of simple design and operation. It has a special patented form with freely flexing side walls, the tread engaging when air is injected and disengaging when this air is valved out. It requires no adjustments after installation, no oiling, and operates as a regular clutch or as a slip clutch on machinery where desired.

Catalogs describing and illustrating the Airflex clutch and giving several practical applications covering various types of installations may be obtained from the Fawick-General Co., Akron, Ohio.

Turbine Pump Business Sold

Announcement has been made by the Roots-Connersville Blower Corp., Connersville, Ind., of the sale of its turbine pump business to the Sterling Pump Corp., Hamilton, Ohio.

YOU CAN FIND A PROFIT IN SMALL JOBS WITH THE RIGHT KIND OF EQUIPMENT



And MADSEN has a small asphalt plant to meet your requirements.

Two plants in small capacity sizes: a 500-lb. batch size, and a 1,000-lb. batch size; complete with elevator, dryer, 4-size screening, accurate weighing through multiple beam scales, asphalt injection and a twin-shaft pug mill mixer.

A complete plant unit, portable, within width, height and weight requirements for moving on any highway. Madsen engineers, pioneers in portable and stationary asphalt plant equipment, have scored another hit in this truly outstanding equipment.

MADSEN
IRON WORKS

HUNTINGTON PARK, CALIFORNIA

Nine Weeks Saved In Paving 8 Blocks

A remarkable saving of 64 days in concrete-hardening time for paving eight blocks of Post Street in downtown San Francisco was achieved recently through the use of Golden Gate 24-hour portland cement. It is reported that merchants whose stores front on Post Street saved thousands of dollars due to the shortened period in which their frontage was blocked.

According to Charles L. Harney of San Francisco, contractor for this job, heavy working traffic was allowed on the new pavement within 48 hours, this time being set by city specifications. With ordinary cement, it would have been necessary to wait ten days. Thus a saving of eight days per block was effected through the use of 24-hour cement. Light delivery trucks were allowed on the new pavement in 14 hours and automobile traffic in 24 hours.

The 24-hour cement used on this project was produced by the Pacific Portland

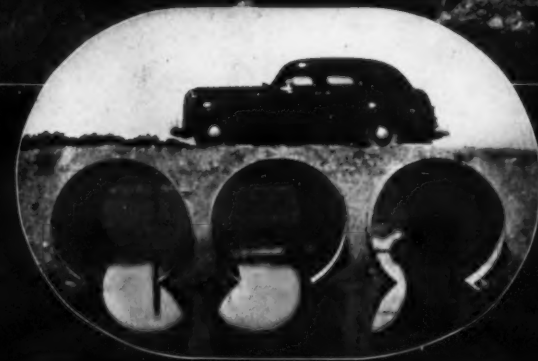
Cement Co. in its Redwood City, Calif., plant. According to J. A. McCarthy, President, this company pioneered early-hardening cement on the Pacific Coast, where it owns the exclusive rights on the basic patent covering the double-burning process by which the cement is produced.

New General Catalog On Gar Wood Equipment

A general catalog has recently been issued by Gar Wood Industries, Inc., Detroit, Mich., illustrating with brief descriptive material its line of equipment. Included are hoists and bodies for hauling and dumping, trucks and trailer tanks of conventional and streamlined design, winches and cranes, and road machinery. The back page of this catalog is given over to illustrations of bulletins issued by this company giving detailed information on this equipment.

A copy of this general catalog, Bulletin No. 25, may be obtained by those interested direct from the manufacturer by mentioning this item.

BRIDGE REPLACEMENTS WITH —



GOHI PIPE
CORRUGATED

Even the most casual observation reveals the fact that more and more large diameter GOHI Pipe is being used to replace small bridges. Lower in first cost, quickly and easily installed, long-lived, trouble-free, wear, weather- and corrosion-resisting, GOHI Pipe is the logical modern drainage structure designed to give maximum protection to all types of roads, from the country lane to the high-speed trunk highway. Road building dollars go farther when you use GOHI Corrugated Pipe.

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Central Culvert Co. Ottumwa, Iowa
Capital City Culvert Co. Madison, Wis.
Bancroft & Martin Rolling Mills Co. S. Portland, Me.
Denver Steel & Iron Works Co. Denver, Colo.
The Lane Pipe Corporation Bush, N. Y.
Dixie Culvert Mfg. Co. Little Rock, Ark.
St. Paul Corrugating Co. St. Paul, Minn.
The Newport Culvert Co. Newport, Ky.



GOHI Pipe meets Copper-Bearing Pure Iron requirements of all specifications published by nationally recognized specifying authorities.



Address the GOHI fabricator nearest you for copy of 72-page book on culvert practice and information on GOHI Corrugated Pipe.

GOHI CULVERT MANUFACTURERS, INC.
NEWPORT, KY.

Be sure it's the

GIANTGRIP
STRAIGHTEDGE

Either Steel or Aluminum

For Checking Concrete Surface

Two useable edges—one sharp-cornered and squared for scraping; the other rounded for line-point straightening.

ASK YOUR DEALER

L & M Manufacturing Co.

(Division of Malleable Forge Co.)

10302 BEREA RD., CLEVELAND, OHIO

Unusual Pile Driving Job at Sepulveda Dam

(Continued from page 1)

way ogee and at the lower end of the spillway and the upstream end of the control channel, to shut off subterranean seepage, while the bearing piles support the spillway. The batter piles are intermingled with the vertical ones and most of them slope upstream to give greater bracing power to the concrete structure which they uphold.

The pile-driving job was sublet to the Tavares Construction Co. of Los Angeles, whose President and General Manager, Carlos Tavares, has had extensive experience in bridge work in Shanghai, China, and has just finished raising the Bridge of the Gods across the Columbia River from a height of 91 feet to 135 feet. (See C&EM, Sept., 1940, pg. 1.)

Because a large proportion of the bearing piles had to be battered into the ground at an angle and the cut-off piles had to be lifted to a height of 120 feet so that the flanged edge would slip into a slot in the adjoining pile, forming a water-tight joint, no pile driver of suitable design or large enough size was available.

The Consolidated Steel Co. of Los Angeles built for the Tavares Construction Co. two 50-ton steel pile drivers, the Lexington and the Saratoga. Both have 90-foot leads, but the former has a 30-foot extension, bringing the total height to 120 feet. Each lead is supported by a 54-foot boom on which it was swung 18 feet either forward or backward to the required angle of 3 to 1 for batter driving. A small separate steam engine swung the leads.

The Lexington is equipped with a McKiernan-Terry 7-ton 11-B-3 hammer which delivers ninety-five 10-ton blows a minute with a 5,000-pound ram. The Saratoga has a 5½-ton 10-D-3 hammer of the same make, giving a hundred and five 6-ton blows a minute. Each hammer has a 19-inch stroke with double-acting mechanism driven by 120 pounds of steam heated in an upright 100-hp boiler using fuel oil costing \$1.10 a barrel.

Each driver is equipped with 2,000 feet of ¾-inch Leschen steel cable, 700 feet of 1½-inch manila rope and 50 feet of 2-inch Goodall steam hose. A 5-ton pull was required to move one of the drivers over a track made of 40-foot fir beams 14 inches square and greased with tallow. The 60-foot 8-inch x 21-inch I-beam runners are shod with 3-inch Bagac, a Philippine hard wood, planking.

Some idea of Tavares' pile-driving speed can be obtained from a record hung up at Sepulveda: 5,300 feet of H piles driven in two 8-hour shifts by both crews. Pile-driving expenses were quite heavy, each rig requiring a crew

of six men at \$10 a day, a foreman and operator at \$12 each, plus compensation insurance and social security taxes.

Furnishing and driving the piles was figured at \$2.20 and \$2.30 per linear foot and the sheet piling at \$1 to \$1.55 per square foot. The Columbia Steel Co. of Los Angeles, a subsidiary of the United States Steel Corp., furnished the piles.

Construction Planning

A new book "Construction Planning and Plant" which is an outgrowth of experience in the construction of TVA dams, has recently been prepared by Adolph J. Ackerman, Civil Engineer, and Charles H. Locher, Contractor, both members of the American Society of Civil Engineers. The book is designed to provide a reference volume for the construction man and contains much useful material on planning the plant and schedule for construction jobs.

Some of the subjects covered include preliminary planning; preparatory work



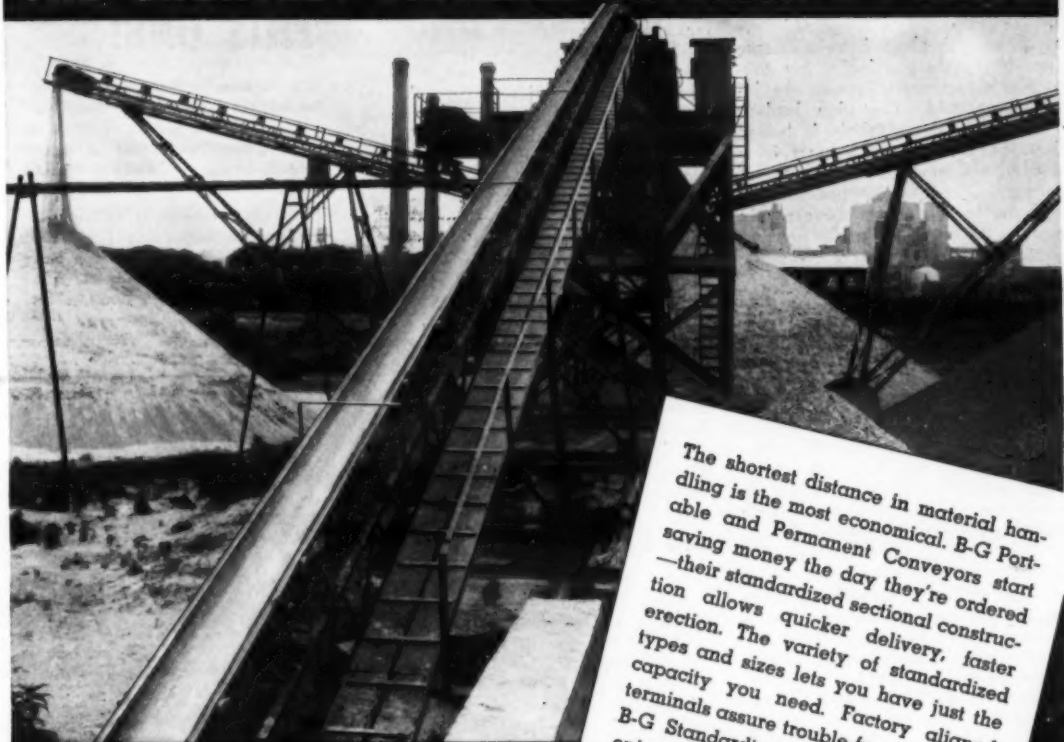
Road-mix work is greatly speeded up by working power graders in tandem or three-up as done by Strong & Grant, Springville, Utah, on State Highway No. 40 near Heber, Utah. These three machines are mixing oil mat 2½ inches deep and 22 feet wide, completing about ¼ mile a day.

and layout of camp and shop buildings; the general plant layout; programming the job; selection of equipment and small tools; measuring equipment performance; cofferdam design and construction, diversion of rivers and final closure; foundations, grouting and consolidation; caissons; material handling;

concrete placing and forms; canals, tunnels, and penstocks; the various types of equipment required; and human relations.

Copies of this book "Construction Planning and Plant," published by the McGraw-Hill Book Co., may be secured from this magazine. Price: \$4.00.

THE SHORTEST DISTANCE BETWEEN 2 POINTS



IS A BARBER-GREENE

The shortest distance in material handling is the most economical. B-G Portable and Permanent Conveyors start saving money the day they're ordered—their standardized sectional construction allows quicker delivery, faster erection. The variety of standardized types and sizes lets you have just the capacity you need. Factory aligned terminals assure trouble-free operation. B-G Standardization simplifies lengthening, shortening, or other altering. In addition, we maintain a department to solve your own problems. The 108 page B-G Conveyor Catalog shows many conveyor installations, and valuable engineering data. Write for your copy.

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AURORA ILLINOIS

THE NATIONAL CARBIDE V-G LIGHT

Gives you daylight conditions on night jobs. Spreads a full, even beam of 8000 candlepower right where you need it.



Lights up the job for twelve hours on one 7-pound charge of National 14-ND Carbide and 7 gallons of water. Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working. Weight 35 lbs. empty; 78 lbs. when full.

Write for catalogs on V-G Light, V-G Handy Light and Lantern

NATIONAL CARBIDE CORPORATION
LINCOLN BLDG. NEW YORK
(Opp. Grand Central)

Subsurface Drainage To Prevent Frost Boils

(Continued from page 17)

trucks into the trenches over the perforated pipe.

Clean-Out Manholes

At maximum distances of 300 feet and also at all angle points in the drainage lines being installed under the present program, clean-out manholes are being installed. These manholes will permit the flushing of drainage lines which may fail by silting and also will assure ample opportunity for inspection of all installations. They were designed by H. R. Turner, Associate Highway Engineer in charge of drainage maintenance for the Connecticut State Highway Department, and M. J. Adams, of the New England Metal Culvert Co.

The manholes consist of two sections of 36-inch diameter Armo corrugated metal pipe with the top section split so that it can be bolted at varying elevations as required around the bottom section. Below these two sections is an adjustable inside steel form which is removable and is clipped to the bottom section during the pouring of the concrete which forms the base of the inspection manhole. The pipe leading into and from the manhole is butted against the inside form so that it is held firmly in place in the bottom of the manhole. As far as possible the face of the excavation for the manhole is used for the outside form for pouring the concrete but if necessary, a separate steel form is used.

The top section of 36-inch metal pipe is capped with a cast iron standard manhole casting held in place by 4 clips bolted to the top barrel.

Savings Expected

During 1939, a total of 6,600 feet of underdrain was installed in seven districts throughout the state. Based on the performance of these installations, it is expected that ordinary maintenance of state highways will be reduced from 12 to 15 per cent of the cost of the subdrainage installation per year. This means that within a maximum of eight years, the subdrainage installation is fully expected to have paid for itself. The very nature of the installation, however, means that it should be in active and effective service for many times that period.

Personnel

William J. Cox is Commissioner, Connecticut State Highway Department, with A. L. Donnelly, Deputy Commissioner of Maintenance, and Homer R. Turner, Associate Engineer in charge of Drainage Maintenance. We are indebted to Mr. Turner for the three illustrations used with this article.

New Type of Meter For Hot Bitumens

A new type of meter, known as the Linameter, which is particularly adapted to the measurement of bituminous materials, is made by the Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia, Penna. This new meter is of the area type, with the meter body installed as an integral part of the pipe line and containing a weighted disk positioned by the velocity of the fluid through a tapered throat section in such a manner that the disk travel is directly proportional to the flow rate. Attached to the weighted disk is a rod and magnetic core, the latter traversing the field of two reactance coils surrounding the pressure-tight tube of the meter body. These coils form a reactance bridge when connected electrically to similar coils in the indicating.

recording and integrating instrument and form the means of transmitting the measurement to any desired distance from the meter body. Measurement is accomplished in the recording instrument by the use of the galvanometer null principle as applied to the Cochrane electric flow meter.

This meter is made in different combinations of indicating, recording and integrating features to suit particular conditions and may be equipped with pressure and temperature elements to record on the same chart with the flow.

Further details on the Linameter are contained in Publication 2100, copies of which may be secured without obligation direct from the manufacturer.

New PRA Consultants

Announcement has been made by the Federal Works Agency of the appointment of Gilmore D. Clarke, Landscape Architect and Dean of the College of Architecture, Cornell University, and Jay Downer, Consulting Engineer of New York City, to serve as technical consultants to the Public Roads Administration. When called upon by Thomas H. MacDonald, Commissioner of Public Roads, these consultants will study special highway, bridge and parkway projects and make reports with recommendations for their planning and development, in order to relieve street and highway congestion, reduce traffic accidents and provide more adequate facilities for national defense. Problems of immediate concern involve needed highway and parkway improvements to facilitate traffic movement entering, proceeding through, and leaving the nation's capital.

Both consultants are nationally known figures in highway, parkway and planning work. Mr. Downer was Chief Engineer and Mr. Clarke, Landscape Architect in the development of the Westchester County, N. Y., system of parkways. They have served as consultants on numerous large projects, such as the Mount Vernon Memorial Highway, the Board of Design of the New York World's Fair, and the Metropolitan Housing Project.

New Catalog Describes Air-Control Shovel

A new 30-page fully illustrated catalog has recently been issued by the Osgood Co., Marion, Ohio, describing the newest Osgood air-control power shovel, the Model 800. All motions of this machine are controlled by air-operated clutches, air being supplied by a 2-cylinder compressor driven from the end of the engine shaft. The controlling valves are of the metering type which permits the operator to apply the clutches at any speed and gives smooth easy operation. All the air control valves are placed directly in front of the operator and all other operating levers, including the engine throttle, are within easy reach.

Copies of the catalog giving complete data and specifications on the Model 800 shovel may be obtained direct from the manufacturer by mentioning this item.

Last call for the 1940 Roadside Development Award nominations. All entries must be in by November 1.

SECOND-HAND COMPRESSORS FOR SALE

Twenty tie tamping compressors, 9 type 14—11 type 20 Ingersoll-Rand gasoline driven, mounted on one-piece cast frame, with axles and flanged wheels for traveling on tracks; also type M-1 Air Guns.

For particulars, write to

E. A. JONES
143 Liberty St., New York City

Welded Wire Fabric For Reinforcing Concrete

Wheeling welded wire fabric is manufactured from special high-grade cold-drawn wire of high tensile strength and with elastic and ductile properties which make it suitable for reinforcing concrete. Longitudinal and transverse wires are welded at the points where they

cross and there are no ties, clips or wraps to become loosened or displaced. It is furnished in square or rectangular mesh in a wide range of sizes, both in gages and spacings.

Copies of Form No. X166 containing complete descriptive data on this wire fabric may be obtained direct from the Wheeling Corrugating Co., Wheeling, W. Va., by mentioning this item.



For BUSY MEN

Your important papers -- WHERE and WHEN -- you want them -- are ready for instant, one hand, selection and reference in the Automatic EXECUTIVE FILE

The Exclusive Expanding drawer feature provides an extra 9" "V"-shaped opening, even in a fully loaded drawer, for easy operation. Papers can be read without removing. No danger of unit tipping forward. Has lock, rubber casters. All steel. Four beautiful finishes.

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This Williams 1/2 Yard Multiple Rope Bucket took plenty of punishment on this job--tearing out the massive stone and concrete foundations of the old Baldwin Locomotive Works in Philadelphia.

The digging power in Williams design and the rugged durability of their welded rolled steel construction make Williams Buckets profit producers for contractors everywhere.



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SPRINGFIELD, OHIO

Texas Regrades Slopes To Stop Wind Erosion

Backsloping, Mulch Sodding and Seeding Tried Out by State Highway Department To Control Erosion Along Highways

ANOTHER angle of the wind erosion problem has been brought out by J. F. Veerling of the Texas Highway Department. Erosion control has been the center of much discussion and experimentation and progress has been made, but there is still much to be done about the devastating and costly erosion caused by wind.

The projection of a highway through grass lands destroys Nature's balance by disturbing the soil binder or cover, leaving naked cuts and fills where the wind can begin its destruction. Mr. Veerling describes what wind erosion can do and how it can be corrected in a recent issue of *Information Exchange*, published by the Texas Highway Department. The example is 6 miles of newly constructed highway on U. S. 83 in Hemphill County, Texas. The subgrade was completed in accordance with plans shortly after Christmas in 1938. An inspection and survey of the grading work about May 1, 1939 showed that in the four months intervening some 7,000 cubic yards of soil had been blown away. The cuts and fills were eroded deeply and the ditches were filled.

Convinced that the maintenance of highways subjected to wind erosion is too expensive, the State Highway Department undertook some experiments with backsloping, mulching and seeding. In 1938 a wind erosion project was set up on U. S. 60 in Hemphill and Lipscomb Counties between the Canadian River and Higgins. The construction of the project was carried out during March and April, 1939.

First, with the permission of the property owners, the private fences on the right-of-way lines were set back where necessary to insure the unhampered movement of equipment, men and materials on the job. Then the eroded and unstable cuts were backsloped to a 4 to 1 or 3 to 1 slope, depending on the depth of the existing cut. To do this, a tractor and grader first cut a furrow through the slope stakes set by the engineer. From this initial furrow the slope

was cut and the excess dirt cast downward with successive "swipes" of the blade. This operation was at times rather troublesome as traction on the sandy slopes was almost nil. The best method of blading was to keep the tractor moving on top of the cut while the grader, pulled by a long cable, cut down the slope.

Having cut the slope, the tractor and grader, or tractor and rotary scraper, pulled what excess dirt there was at the toe of the slope and used it for filling low ditches and widening adjacent fills. Upon completion of the rough grading, the whole project was finished off with a drag consisting merely of a long heavy 12 x 12-inch timber hitched to a tractor with chains.

After backsloping, a mulch of rye and wheat straw was placed by hand over all the newly graded areas, including slopes, ditches and fills, to a depth of approximately 2 inches.

Then the men scattered grass seed and skunkbrush seed over the straw at the following rate:

Sand drop seed (collected unthreshed hay).....	50 lbs. per acre
Sand seed grass (collected, threshed).....	10 lbs. per acre
Skunkbrush.....	5 lbs. per acre

With the seeding completed, the mulch was turned under by hand labor using manure forks. In turning the mulch, only enough dirt was turned to hold the straw in place.

As the grading, seeding and mulching was completed, each cut was sprinkled, the watering equipment consisting of a 1½-ton flat-bed truck with a 1,000-gallon water tank fitted with some 50 feet of hose and a water pump powered with a small ½-hp gasoline engine. Sprinkling was continued from day to day until a good rain wet the work thoroughly.

Since the completion of the project, there have been enough windy days to test the work and the job has stood up very well. Furthermore, the wheat and rye seed, which were carried to the job in the mulch, and the weed seeds which were blown in or were present in the dirt at the time of backsloping, have germinated. There is also a light stand of reed grass. The results of these experiments have indicated that this procedure for wind erosion control is entirely practical and satisfactory.

New D-C Arc Welder

A new 200-ampere direct-current arc welder which will provide any welding current from 25 to 250 amperes has recently been announced by the General Electric Co., Schenectady, N. Y. This wide range allows all-day manual welding with currents up to 200 amperes, using electrodes from 1/6 to 3/16 inch in diameter. Capacity is also provided for the use of electrodes as large as 1/4 inch on occasional short jobs.

This new welder has two main features: first, it provides for instant recovery of the voltage to an extent greater than the arc voltage after each short circuit, thus preventing time-wasting arc pop-outs; and second, it does not allow current peaks to exceed three times the steady short-circuit current on any adjustment, thus preventing excessive heat and spatter and resulting in a saving of electrodes. Both of these features are made possible by a split-pole cross-field design with which the equipment is provided.

Other features of this new arc welder include isothermic overload protection for the motor; self-excitation, which

does away with the necessity for an extra generating unit; quick adjustment of the welding current; and horizontal mounting.

Self-sealed ball bearings are used, and an improved ventilating system prevents overheating even when the welder is operated hour after hour. A full range of current adjustment is obtained without the use of a current resistor.

All-Wheel-Drive Trucks

The new models of the Marmon-Herrington heavy-duty all-wheel-drive trucks are described in a folder recently issued by Marmon-Herrington Co., Inc., Indianapolis, Ind. This new DSD series is available in thirty-three different models with gross capacities up to 70,000 pounds. Miscellaneous illustrations, general description, detailed specifications and a summary of important features of Marmon-Herrington design are included in this folder.

Copies may be obtained by writing direct to the manufacturer.

Minute "HOW" Stories



EASY, LOW-COST WAY to HANDLE YOUR LOADS

Use a LeTourneau Crane

For faster, easier handling of your heavy materials, assign these jobs to a LeTourneau Tractor Crane: loading and unloading supplies and equipment; lifting, moving and stacking materials; placing forms and spotting machinery. Ideal for field erection of structures.

Simple, Easy to Operate

The LeTourneau Tractor Crane requires no special roads, tracks or overhead structures. Travels on two wheels anywhere tractor will go. Operates by cable from the standard LeTourneau Power Control Unit that controls all other LeTourneau tools. Made in 3 boom lengths—20, 30 and 40-feet—for "Caterpillar" tractors from 30 to 95 h.p. Safely handles maximum loads of 4 to 10 tons, depending on tractor size. Can be attached or detached in 15 to 20 minutes, so tractor can be used for Dozing, Carryall Scraper operation and other work.

Try the Savings, Yourself

You'll find dozens of places where this Tractor Crane will save you money. Investigate the savings by demonstration. See your nearest LeTourneau-"Caterpillar" dealer TODAY... or send the coupon below for more information.

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 Name _____
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BRAKE BLOCKS and FRICTIONS

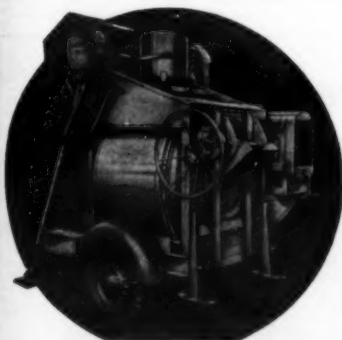
GATKE Moulded Asbestos Brake Blocks and Clutch Frictions really stand out on tough jobs.

Heavy loads and hard service quickly demonstrate their great holding power and uniformly smooth action at all service temperatures.

Designed by men who understand operators' service requirements and moulded to exact fit for every brake, clutch or friction.

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- 55 TO 145 ALIKE IN ALL BUT SIZE—real heavy duty service in light, fast, and discharge trailers with 2 or 4-wheel mounting interchangeable.
- Jaeger Criss-Cross "Rel"-Mix Drum, Skip Shaker Loader, fastest "Pressure" Discharge—features that have made Jaeger the world's biggest selling line.

3/4" with Measuring Hatch Hopper Mixer 30% to 40% More! log and prices.
THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

Batching and Pouring On Vt. Paving Project

(Continued from page 2)

four scratch-boards handled the final grade which was compacted with an 8-ton 3-wheel roller.

Reinforcing and Expansion Joints

Vermont uses a standard bar mat pre-assembled and consisting of two layers of $\frac{3}{8}$ -inch round deformed bars spaced 3 inches apart vertically and made with a wire stirrup to support the assembled mat so that the top bars are 2 inches from the top of the finished slab and the bottom bars are the same distance from the subgrade. Bent corner bars to strengthen the slab at the four corners are the same as the bars used in the mat.

The expansion joints are placed 55 feet 4 inches apart, permitting the use of five 11-foot mats between expansion joints with 1-foot laps. The joint material is $\frac{1}{2}$ -inch cork set to within $\frac{1}{2}$ inch of the top of the slab with a bulkhead behind it and an equal leg cap on top. The upper $\frac{1}{2}$ inch of the expansion joint is hand-poured with asphalt. The connecting dowels through the expansion joint are $\frac{3}{4}$ -inch round plain dowels 2 feet long, capped at one end with a metal cap 6 inches long with the end crimped to allow a 1-inch air space at the extreme end of the bar.

The adjacent slabs are tied together with $\frac{3}{8}$ -inch round deformed dowels set when the first slab is poured. They are bent at 90 degrees and are held by hand against the form adjacent to the second slab to be poured. Heavy paper containing four slits to make two bands to hold the paper on the dowel is slipped over the leg against the form. Thus, when the forms have been stripped and it is time to pour the second slab, the bond between the section of the bar to be bent out straight and the concrete already poured is easily broken and the bar bent out by slipping a pipe over the end and pulling away from the slab. These dowels are 4 feet long with 2 feet in each slab and are spaced 2 feet 10 inches on center.

Batching and Pouring

The contractor's batching plant was set up at the side of the road being paved about one-third of the distance from the southwest end. All of the crushed gravel and sand was hauled in by truck from a commercial plant about 2 miles south of Rutland, delivered to a stockpile and then rehandled to the Blaw-Knox weighing batching plant by a Thew-Lorain 75B crane with a 45-foot boom and a 1-yard Erie clamshell bucket. Seven 2-batch trucks were hired locally to haul the weighed batches and the five bags of portland and one bag of natural cement from the batching yard to the paver. The cement platform was located between the batching plant and the roadway and four men on the platform placed the bags of cement on each batch and one man below shook out the empty bags as returned from the paver.

Water for the mix was supplied from a brook near the batching plant where a Barnes triplex high-pressure pump delivered the water to a 2-inch pipe laid on the shoulder.

The trucks drove up beyond the paver and onto the subgrade through a breach in the forms or off the first slab that was poured and backed to the paver where they were dumped by one man who also cleaned the trucks. The 27-E Multi-Footer paver operated by one man gave the batch a $1\frac{1}{2}$ -minute mix and delivered it to the subgrade. The paver pulled a scratch-board consisting of a 6 x 6 timber with heavy spikes in the bottom. This scratch-board had a tendency to dig in as was evidenced by the exposure of the base of the forms

in numerous instances. Four puddlers placed the concrete after it was spread by the paver bucket and a foreman and three steel men brought in the mats which were spotted along the shoulder and also set the expansion joints and the assembly of ten dowels through each joint.

Finishing and Curing

A double-screed Lakewood finishing machine followed closely behind the puddlers and compacted the surface by maintaining a heavy roll of the dry concrete on the first screed. Four hand finishers completed the pavement. The first two pulled a 12-foot longitudinal float and then a 10-inch light rubberized canvas belt and also pulled the bulkhead at the expansion joints. The second pair of finishers broomed the surface to give it a non-skid finish and then edged the sides, pulled the cap on the expansion joint and edged the sides of the joint.

The pavement was cured by spraying with a light coat of Socony cut-back having a viscosity of 17. This was sprayed by a power sprayer and hand nozzle as soon as the sheen of water had left the surface of the pavement so that the cut-back would cling to the concrete.

Major Quantities

The major construction quantities on this 2.064-mile grading and paving job were as follows:

Item	Quantities
Solid rock.....	100 cubic yards
Common excavation, including borrow.....	26,500 cubic yards
Trench excavation.....	1,470 cubic yards
Gravel sub-base borrow.....	17,900 cubic yards
Cut-back asphalt for pre-mix shoulders.....	19,000 gallons
Concrete pavement, one course.....	4,710 cubic yards
Gravel pre-mix shoulder.....	1,000 cubic yards
Class A (1: 2: 3½) concrete, 6-bag mix.....	113 cubic yards
Class C (1: 2: 4½) concrete, 5-bag mix.....	72 cubic yards
(Both Class A and Class C concrete include 1 bag of natural cement)	
Reinforcing steel for culverts.....	9,800 pounds
Cement rubble masonry.....	500 cubic yards
18-inch r. c. pipe.....	452 feet
24-inch r. c. pipe.....	352 feet
30-inch r. c. pipe.....	60 feet
36-inch r. c. pipe.....	180 feet
12-inch corrugated galvanized metal culvert pipe, asphalt-coated.....	156 feet
15-inch corrugated galvanized metal culvert pipe, asphalt-coated.....	386 feet
18-inch corrugated galvanized metal culvert pipe, asphalt-coated.....	32 feet
48-inch corrugated galvanized metal culvert pipe, asphalt-coated.....	300 feet
Wood guard rail.....	3,032 feet
Cable guard rail.....	136 feet

Personnel

For the Troy Paving Co. of Hudson Falls, N. Y., J. G. Piscitelli, President, was in charge of the work with E. L. Somers, Superintendent. Vail O. Leach was Resident Engineer for the Vermont Highway Department.

Want information? Write the Editor.

Concrete Form Board

Masonite Special Tempered Presdwood concrete form board is a manufactured board, made entirely of wood fibres by the Mason Process. It should in no way be confused with the previously made board as it is much denser, less absorptive and of considerably greater structural strength than Standard Presdwood. According to the manufacturer, its use as concrete form board not only insures better concrete

but also effects substantial economies inasmuch as the forms can be reused many times.

The Masonite Corp., 111 W. Washington St., Chicago, Ill., has recently issued a catalog describing the physical characteristics of Tempered Presdwood and giving specifications and deflection charts with a typical example for the use of the charts. Copies of this catalog may be obtained by those interested direct from the manufacturer.

CONTRACTORS BARROWS

with Round Fronts

Type M-11

The only barrow with tray having double folded corners and three thicknesses of steel at folds, and non-leakable

Write for Catalog 40C

JACKSON MANUFACTURING COMPANY,

HARRISBURG, PENNSYLVANIA

MANUFACTURERS OF:
WHEELBARROWS • LAWN
ROLLERS • CONCRETE
CARTS • DRAG SCRAPERS
• MORTAR PANS • MORTAR MIXING BOXES

ONLY CMC DUAL PRIME PUMPS GIVE TWO PRIMING ACTIONS!

DOUBLY FAST
DOUBLY SURE!

CMC Pumps are making "top" performance records in all kinds of service. A COMPLETE LINE from $1\frac{1}{2}$ " to the big 10" units with a capacity of 240,000 G.P.H. Also new "triple prime" well point units—2 stage high pressure pumps and sand pumps.



New CMC Bin Datcher. With CMC 100 or 140 Mixer it takes the advantages of the central mixing plant to every job at unbelievably low cost.



New CMC Kest Kutter Speed Saw give you fast, precision sawing service for many uses. Kest Kutter Jr. has 14" Saw powered with 6 H.P. Wisconsin Engine. Kest Kutter Jr. has 10" saw powered with 3.6 H.P.



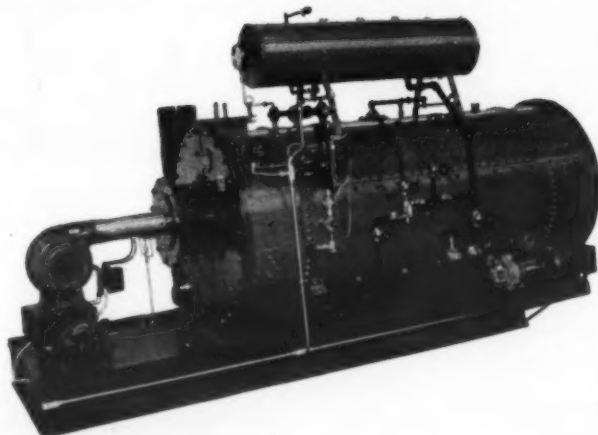
New CMC Hoists—low priced, high quality. Huskily built, easier operation, single and double drum units from 5 to 40 H.P. More economical to use—safe to own.

Get the CMC catalog just out showing the very latest in Concrete, Plaster, Mortar and Bituminous Mixers, Pumps, Power Saws, Hoisting and placing equipment, Carts and Barrows.

CONSTRUCTION MACHINERY COMPANY, Waterloo, Iowa

for all COLD WEATHER needs CLEAVER PORTABLE STEAM PLANTS

Unit shown includes 50-hp A.S.M.E. boiler for 150 pounds working pressure, fully automatic oil burner including controls, automatic boiler feed system including condensate return, completely self-contained on rugged channel iron frame requiring no base. Can be moved from place to place as easily as an engine. Ideal for heating water for winter concreting, heating aggregate in bins, heating aggregate in stock piles, heating temporary and permanent buildings, thawing and steam cleaning work of all kinds. Write today for full details. Send for new literature today. This also shows hot water Boosters, Portable Steam Tank Car Heaters and Boosters for bituminous materials.



CLEAVER-BROOKS COMPANY 3112 W. Center St., MILWAUKEE WISCONSIN

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1942-43 Road Funds Under Highway Act

The Hayden-Cartwright Federal Highway Act of 1940 provides \$327,000,000 for highways for the fiscal years 1942 and 1943. In addition the new bill authorizes the use of funds made available under Section 21 of the Act to pay the entire engineering costs of surveys, plans, specifications, estimates and supervision of construction of projects for such urgent improvements of highways strategically important from the standpoint of national defense on order of the Federal Works Administrator in cooperation with the Secretary of War, the Secretary of the Navy or other authorized national defense agency.

Another section dealing with national defense provides that "in approving Federal-Aid highway projects to be carried out with any unobligated funds apportioned to any state, the Commissioner of Public Roads may give priority of approval to, and expedite the construction of, projects that are recommended by the appropriate Federal defense agency as important to the national defense."

The Act also authorizes the Reconstruction Finance Corp. to cooperate with the states to aid in financing the acquisition of real property necessary or desirable for road projects eligible for Federal Aid. It is further provided that any such transaction shall be made only after approval of the project by the highway department of the state concerned and by the Public Roads Administration. While these provisions do not make any substantial change in the existing policy of the R.F.C., they do constitute a strong declaration of policy.

The following apportionment of funds authorized for each of the fiscal years 1942 and 1943 is based on factors used in apportioning the 1941 authorizations.

State	Regular Federal Aid	Secondary or Feeder Roads	Grade Crossings	Total
Ala.	\$2,070,000	\$342,000	\$393,000	\$2,825,000
Ark.	1,423,000	249,000	128,000	1,800,000
Ariz.	1,700,000	297,000	340,000	2,337,000
Calif.	3,796,000	645,000	741,000	5,204,000
Colo.	1,807,000	317,000	251,000	2,375,000
Conn.	425,000	109,000	166,000	600,000
Del.	488,000	85,000	97,000	670,000
Fla.	1,347,000	236,000	278,000	1,861,000
Ga.	2,507,000	439,000	487,000	3,433,000
Iaho	1,226,000	215,000	162,000	1,603,000
Ill.	4,044,000	708,000	1,030,000	5,782,000
Ind.	2,425,000	424,000	504,000	3,353,000
Iowa	2,535,000	444,000	546,000	3,525,000
Kan.	2,587,000	453,000	504,000	3,544,000
Ky.	1,820,000	319,000	356,000	2,495,000
La.	1,437,000	251,000	310,000	1,998,000
Maine	872,000	153,000	135,000	1,160,000
Mass.	821,000	144,000	200,000	1,165,000
Mich.	1,375,000	241,000	267,000	1,883,000
Minn.	3,014,000	527,000	647,000	4,188,000
Miss.	2,677,000	472,000	522,000	3,671,000
Mont.	1,754,000	307,000	310,000	2,371,000
Neb.	2,783,000	522,000	594,000	4,099,000
N.H.	2,027,000	355,000	264,000	2,646,000
N.J.	2,025,000	354,000	348,000	2,727,000
N.Y.	1,271,000	222,000	97,000	1,590,000
N.C.	488,000	85,000	97,000	670,000
N.D.	1,322,000	231,000	290,000	1,843,000
Pa.	1,403,000	281,000	166,000	2,050,000
R.I.	845,000	148,000	134,000	1,127,000
S. Car.	2,324,000	407,000	503,000	3,234,000
S. Dak.	1,526,000	267,000	308,000	2,101,000
Tenn.	3,581,000	627,000	833,000	5,041,000
Tex.	2,323,000	407,000	457,000	3,187,000
Va.	1,439,000	287,000	223,000	2,149,000
Wash.	4,220,000	739,000	1,127,000	6,086,000
W. Va.	488,000	85,000	97,000	670,000
Wis.	1,329,000	231,000	297,000	1,857,000
Wyo.	1,610,000	282,000	268,000	2,160,000
Total	2,080,000	364,000	373,000	2,817,000
Unall.	4,229,000	1,070,000	1,087,000	6,406,000
W.	1,125,000	197,000	129,000	1,451,000
W.	488,000	85,000	97,000	670,000
W.	1,814,000	317,000	372,000	2,503,000
W.	1,573,000	275,000	300,000	2,148,000
W.	1,083,000	190,000	261,000	1,534,000
W.	2,410,000	422,000	484,000	3,316,000
W.	1,252,000	219,000	131,000	1,602,000
W.	488,000	85,000	97,000	671,000
W.	488,000	85,000	149,000	722,000

Gas Engine Starting For Diesel Welder

The application of gasoline engine starting on diesel-driven arc welders, previously announced for a 300-ampere unit by the Lincoln Electric Co., Cleveland, Ohio, has been extended and is now available on a 400-ampere model. This feature makes available easy starting in any weather and the inherent economies of diesel drive in the many applications for welders of capacities up to 400 amperes.

The gasoline starting engine is a small auxiliary mounted above the diesel and

is started by a hand crank. A belt drive, engaged by means of a clutch, connects the starting engine to the diesel. Starting in extremely cold weather is facilitated by having the cooling system of the small starting engine connected into the cooling system of the diesel, which permits warming up the diesel by running the starting engine a short time and allowing the heated water to circulate through the diesel engine.

The Shield Arc SAE arc welding generator used on this 400-ampere diesel welder is equipped with dual continuous control and a number of other features. A substantial channel frame provides mounting for the entire unit. The frame of the arc welding generator is attached directly to the diesel engine bell housing. A special type of flexible coupling connects the generator shaft to the engine flywheel.

Further information on these diesel welders, as well as data on savings in fuel costs through the use of diesel power, may be secured by those interested direct from the manufacturer.

New Caution Signs

The IPCO Hi-Boy swing sign for warning of construction under way, danger ahead and similar temporary hazards on the highway consists of an all-metal sign and standard which is non-tilting, of durable construction and which has high visibility. The sign frame is suspended by a free pivot on each side, allowing it to move with varying wind pressures within limits that permit full vision of the sign at all times. This principle also permits the sign standard to relieve wind pressure and eliminates the possibility of being blown over.

The legs of the standard are of one-piece construction, so designed that one fits inside the other when the standard is collapsed, and are reinforced with an angle iron cross bar. Hinges on each side keep the standard locked in position when in service. Flag sockets on either side are of steel tubing, electric welded to the sign frame. The standard, when in service, is 45½ inches high, without the flags, and 22 inches wide. Collapsed



One of the new IPCO Hi-Boy caution signs.

for storing, it is 50 x 22 x 1¼ inches. The sign is 18 x 18 inches, with black letters and border on a yellow background. Red flags, 18 x 18 inches, are mounted on a 1 x 24-inch staff.

Further information on these warning signs may be secured by interested contractors and state and county highway engineers direct from the Industrial Products Co., 841 W. Somerset St., Philadelphia, Pa.



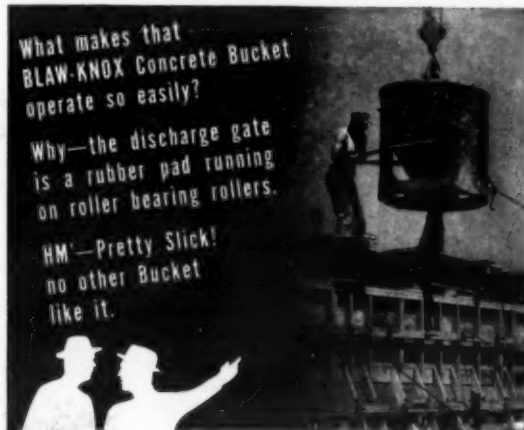
"We don't worry about concrete, we have a BLAW-KNOX CENTRAL MIXING PLANT on the job."

Engineering advice, based on sound experience, is offered as a part of Blaw-Knox service in the design and arrangement of a central mixing plant for your job.

Stationary or floating plants, manual or automatic in operation, have been furnished on hundreds of jobs. Many of them are illustrated in Blaw-Knox Catalog No. 1566.

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BLAW-KNOX Central Mixing Plants



What makes that BLAW-KNOX Concrete Bucket operate so easily? Why—the discharge gate is a rubber pad running on roller bearing rollers. HM—Pretty Slick! no other Bucket like it.

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BLAW-KNOX Roller Gate CONCRETE BUCKETS

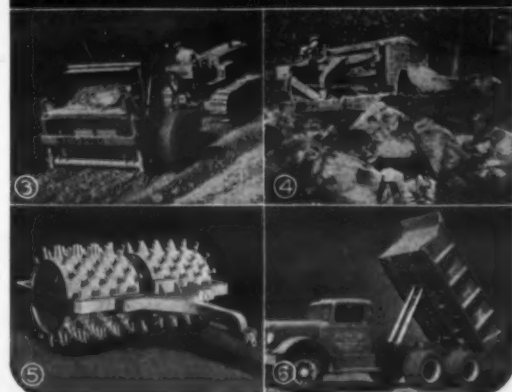


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Heil's complete Road Machinery line includes the right unit to make your tough jobs profitable ones. Popular dirt-movers that load fast, dump fast, cut and spread accurately, turn in a short radius, hitch and unhitch easily. These dependable Heil advantages help many contractors to operate at a profit. Let them help you do top-quality, clean-cut work—and make money. Equip yourself with (1) Heil Twin-cable Scoops, (2) Heil Dig-N-Carry Hydraulic Scoops, (3) Heil-Baker Two-Wheel Scoops, (4) Heil Trailbuilders and Bulldozers, (5) Heil Sheeps-foot tamping rollers, or (6) Heil Hydraulic Dump Units. Send today for free literature.

THE HEIL CO.

MILWAUKEE, WISCONSIN HILLSIDE, NEW JERSEY





The new Blaw-Knox telescopic chute.

New Telescopic Chute For Cement Batcher

A new telescopic chute for use on bulk-cement weighing batchers to accommodate various sizes and heights of batch trucks and truck mixers has been developed by the Blaw-Knox Co., Pittsburgh, Penna. A number of these were furnished for use on Pennsylvania Turnpike contracts and other projects where batching plants are called upon to serve a wide variety of trucks.

Because the chute compensates for varying heights with a minimum loss of time, batching operations are facilitated. Ease of adjustment is assured by a counterweighted construction. The amount of vertical adjustment ranges between 31 and 50 inches, and cement spillage during discharge is thus eliminated.

This new chute can be furnished with standard manual cement batchers, for the shrouded type of batcher required in some states, or any Blaw-Knox cement batcher of the rotary discharge valve type.

A New Low-Capacity Portable Compressor

The latest addition to the Schramm line of Fordair portable air compressors is the Model 40, a low-capacity unit with all the features of the larger Schramm units. It is available with skid mounting or on a two-wheel trailer for easy portability about the job or from one job to another.

The use of a combined air tank and frame and the elimination of unnecessary parts has reduced the weight as well as the cost of this new compressor, while its features include electric-starting equipment, full force-feed lubrication to all parts, water cooling complete with pumps, radiator and battery, and all of the regular automatic controls found on the big Schramm compressors. The pneumatic-tired two-wheel trailer has a substantial axle combined with a universal hitch which makes it easy to tow the unit behind a car or truck. The engine consists of four cylinders of a Ford V-8 3 1/4 x 3 3/4-inch bore and stroke engine, and the compressor of four cylinders of the Ford V-8 engine. The Model 40's capacity is 40 cfm actual air delivery at 100 pounds pressure.

Another feature of the Fordair compressors is that they are now available as bare units, known as shipping units, and designed to become an integral part of any piece of equipment requiring compressed air for operation. These units are identical to the compressor units used in the two-wheel trailers and other Fordair models, and are simply stripped so that they can be adapted to special applications by the users. These shipping units are available in the Model 40 size and also in the 60-cfm size.

Copies of Bulletin 4015-3, describing and illustrating the Model 40, and of Bulletin 4015-6 on the shipping units,

may be secured by interested contractors and state and county highway engineers direct from Schramm, Inc., West Chester, Penna., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Uses of Self-Locking Nuts Described in New Bulletin

The many uses and advantages of Elastic Stop Nuts, a self-locking nut for use in steel construction, for maintaining an oil-tight seal on gear boxes, on the main connections of flexible couplings, to withstand the vibration of rock drills, on vibrating screens, for holding a pump impeller on its shaft, holding a split sprocket together or many other similar services, are described and illustrated in Bulletin L40-10 issued by the Elastic Stop Nut Corp., 2332 Vauxhall Road, Union, N. J., which will be glad to send copies on request.

This company recently moved its offices to its new plant in Union which is being used exclusively for the manufacture of Elastic Stop Nuts. A feature of the construction of this new building is that all of the steel is fastened with bolts and these self-locking nuts, instead of with rivets.

Redwood Expansion Joints For Concrete Pavements

The California Redwood Association, 405 Montgomery St., San Francisco, Calif., has recently issued a bulletin on redwood expansion joints for concrete work such as highways, airplane landing fields and aprons, docks, and other forms of concrete slab construction. According to the Association, California redwood of selected quality, meeting the specifications of the U.S. Public Roads

Administration, has compressive characteristics that adapt it to expansion joint service. At a 50 per cent reduction of strip thickness, redwood joints control the compressive stress within limits of 1,000 to 1,500 pounds per square inch, depending on the specifications adopted. Other qualities such as elasticity, no ex-

trusion, strength, decay resistance, simplicity and low cost are described at length in this bulletin and standard specifications are given.

Copies of this Technical Bulletin No. 20 may be obtained by those interested direct from the Association by mentioning this magazine.

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Coming UP the Mountain with a TREMENDOUS LOAD



The Rogers Trailer which hauled this 75 ton transformer up a steep Colorado mountain for the Metropolitan Water District was designed for minimum loading height and road clearance; fabricated from steel of high tensile strength and completely electrically welded; mounted on double-oscillating axles to distribute the load over 20 tires and equipped with a highly developed braking system to afford complete safety of control under difficult conditions rarely encountered.

Before buying your trailer learn why the Rogers is the first choice of a majority of moving and erecting engineers. 108 Orchard St.

ROGERS BROS. CORP. Albion, Penna.
EXPERIENCE built it • PERFORMANCE sold it

THESE TWO LITTLEFORD UNITS MEAN FASTER—MORE EFFICIENT APPLICATION OF MATERIALS

The Combination of the Littleford "Tankar" Heater and the Littleford Pressure Distributor gives to users, the fastest heating and applying units known to the Black Top industry. The "Tankar" Heater heats one or two tank cars of tar or asphalt, etc., in 1/2 less time than ordinary units. The Pressure Distributor with its gadgetless construction and simplicity of operation applies these materials with unequalled efficiency. The "Tankar" Heater can be used as a cleaning unit for motors, walls, garage floors, platforms or distributors.

The Littleford "Tankar" Heater and Pressure Distributor is a combination you can't beat. Write for details.



485 E. Pearl St.

LITTLEFORD BROS.

Cincinnati, Ohio



Road Organization Of Big Iowa County

Financing and Machines For Maintaining 1,000 Miles Of Roads on Two County Systems in Polk County

(Photo on page 1)

WITH the largest city in Iowa in its midst, Polk County has a great responsibility in maintaining its county trunk system of 304.53 miles and its local highway system, amounting to 681.12 miles, in such condition throughout the year that the great farm and urban populations may each be served effectively. The county has an area of 581 square miles and the City of Des Moines, which is both the state capital and the county seat, has an area of 54 square miles. The state highway mileage in Polk County is 119.4 miles, but the county has no responsibility for construction, maintenance or for snow removal on this state highway mileage.

Organization

The county has five supervisor districts, of which two are located in Des Moines and the other three outside the capital city. The supervisors are elected for 3-year terms and appoint the county engineer.

Three central storage garages are maintained in the three outside supervisor districts, and in addition ten storage sheds in the townships. These latter are rented or may be a foreman's barn and, consequently, are not permanently under lease to the county.

The 985.6 miles of highways in the two county systems are chiefly gravel surfaced, as will be seen in the following table.

Type	Trunk System	Local System
Concrete	9.19 miles	0.42 miles
Gravel	292.84 "	549.66 "
Bituminous	0 "	0 "
Other	2.50 "	151.04 "
Total	304.53 "	681.12 "

Financing

The finances for the County Highway Department and its activities are received from returns from the state gasoline tax, from the motor carrier tax, from real estate taxes and a one-mill emergency tax, as well as Federal Aid. The state gas tax is distributed to the counties on the basis of four-ninths of the total receipts from the 3-cent gasoline tax over the entire state being divided among the counties on an area basis. In 1939, Polk County received \$61,000 from this source. The motor carrier tax, prior to 1940, was distributed to the counties in proportion to roads traveled by busses on regular routes in those counties. From this source Polk County received \$19,000. The 1939 Legislature changed the motor carrier tax to a license tax whereby motor vehicles engaged in transport either of passengers or freight within the state are licensed at a cost up to \$250 per vehicle per year. One half of these motor carrier license receipts is now returned to the counties in proportion to the area of the counties and is earmarked for the maintenance of county roads. The receipts from the county real estate tax in 1939 amounted to \$245,352. In addition there was a one-mill emergency tax on real estate, the receipts from which were used for relief projects.

In 1940 the county received a total of \$48,404 for farm-to-market road construction, \$21,867 of which is from Federal Aid and \$26,537 from the State Primary Road Fund. This money from Federal Aid is the first received by Polk County from this source and represents allotments made by the Federal Gov-

ernment for the years 1938, 1939, 1940 and 1941. Due to the comparatively small sum per year for the various counties, the expenditure is rotated among the counties so that each county will receive their full quota at one time. Polk County built five bridges during 1940 with this fund, two of these structures being 180 feet each in length.

The total expenditures in Polk County for 1939 were \$147,289 for construction, and \$220,222 for maintenance. Of this total, \$35,000 came from the one-mill emergency tax.

Equipment

The purchase of equipment in Polk County is controlled by the supervisors, but inasmuch as no road work is done within the 54 square miles of the City of Des Moines and as two of the supervisors' districts are in this area, the purchase of equipment is done by the supervisors in the three outside districts. The equipment purchased and operated in these three outside districts is as follows:

DISTRICT THREE

- 2 Allis-Chalmers Model L tractors
- 5 Allis-Chalmers Model K tractors
- 1 Allis-Chalmers maintainer and snow plow
- 1 Allis-Chalmers power grader
- 1 Austin-Western maintainer
- 1 Adams 14-foot grader
- 1 Adams 12-foot grader
- 2 Century graders
- 2 Adams No. 84 graders
- 2 Baker snow plows for Model L tractors
- 2 Baker snow plows for Model K tractors
- 1 Wausau snow plow for Model K tractor
- 1 concrete mixer
- 1 Lincoln electric welder
- 2 Euclid Wheelers
- 2 rotary scrapers
- 1 elevating grader

DISTRICT FOUR

- 1 Caterpillar Sixty tractor
- 2 Caterpillar RD4 tractors
- 2 Caterpillar RD7 tractors
- 1 Caterpillar Thirty tractor
- 1 Austin-Western maintainer and plow
- 1 Caterpillar No. 11 Auto Patrol and plow
- 1 Caterpillar No. 10 Auto Patrol
- 1 Caterpillar No. 12 Auto Patrol
- 1 elevating grader
- 2 Adams No. 124 graders
- 1 Adams K-10 grader
- 1 Adams No. 104 grader
- 1 Caterpillar No. 44 graders
- 1 Adams K-12 grader
- 1 snow plow for No. 12 Auto Patrol
- 1 Wisconsin plow for RD7 tractor
- 1 Wausau plow for Caterpillar Sixty
- 1 LaPlant-Chouteau snow plow
- 1 Austin-Western 5-yard scoop
- 3 mowers
- 3 rotary scrapers
- 1 concrete mixer
- 1 Chevrolet truck
- 3 Euclid Wheelers

DISTRICT FIVE

- 4 Caterpillar RD6 tractors
- 2 Caterpillar Thirty tractors
- 1 Allis-Chalmers Model L tractor
- 1 Caterpillar RD7 tractor
- 1 Caterpillar No. 11 Auto Patrol
- 1 Caterpillar Twenty tractor
- 1 Adams maintainer and plow
- 1 elevating grader
- 1 Adams No. 84 grader
- 1 Adams No. 104 grader
- 2 Caterpillar No. 44 graders
- 1 Austin-Western No. 10 grader
- 1 mower for Caterpillar Twenty tractor
- 1 Baker snow plow for Model L Tractor
- 3 snow plows for RD6 tractors
- 2 snow plows for Caterpillar tractors
- 2 snow plows for Caterpillar Thirty tractors
- 4 truck snow plows
- 2 rotary scrapers
- 1 Western No. 5 planer
- 1 hoist for tractor
- 1 concrete mixer
- 1 power mower
- 3 Warco scoops
- 1 snow plow wing for No. 12 grader
- 10 miles of snow fence (for entire county)

In the flat terrain of Polk County, as in many other sections of Iowa, a snow fence proves most effective. In the snow storm of the second week of January, 1940, when about 12 inches of snow fell over a large portion of Iowa, there were many demonstrations of the effectiveness of snow fence, placed 50 to 75 feet from the roads, as the snow had drifted 6 and 8 feet high on the lee side of the snow fence, and the roads were clear. Those areas without snow fences experienced considerable drifting, requiring heavy snow plows to keep the roads open and even then, as long as the winds continued, the fine snow drifted into the highway and made plowing continuously for 48 hours, some of the roads in Polk County were just as badly drifted as when the plows started. For this reason it was stopped at sun-

down of the third day of plowing, to give the men a rest, and then the plows were put to work again after midnight when the gale ceased.

Snow Removal Organization

Each tractor owned by Polk County has a snow plow of the V-type and some of them are equipped with wings. The storm mentioned above struck the east and west highways and, inasmuch as these are among the most important highways running through the county, the plows were put on to them first. Regular reports are received by telephone from all county equipment engaged in snow plowing as frequently as the plows reach points where they can report. The snow storm described was typical of the dry snows in this section which drift badly with the wind. Some of the county trucks are equipped with reversible blade plows mounted in front of the trucks.

Frank O. Laing, County Engineer of Polk County, has been in this office for

21 years, and prior to that time was for 6 years County Engineer of Warren County, Iowa.

With "Roads for Defense" as its theme, the 1941 A.R.B.A. Convention to be held in New York City next January will be an important one to the nation as well as to members of the highway industry.

**TARPAULINS
ROAD MATS
WINDBREAKS**

write for prices

CONTRACTORS' SUPPLY DEALERS in every state sell the Fulton line. Specify SHURE-DRY and FULTON Tents, Tarpaulins, and Windbreaks—anything made of canvas. Also Fulton Road Mats and Barrios. Fulton products are good and their prices are right. If your dealer can't supply you, write our nearest plant for names, samples and price list.

Fulton Bag & Cotton Mills

Memphis, Tenn. 1000
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**KEEP YOUR JOBS MOVING
ON FAST SCHEDULE
With MALL PORTABLE POWER TOOLS**

**Save Time * Labor
Money and Material**

Profit-wise contractors are eliminating costly delays and increasing their profits with this popular priced MALL vibrator. It assures a better bond with reinforcement, eliminates honeycombs and voids, and permits use of coarser aggregates. Operates all day on 1½ to 2 gallons of gasoline. The flexible shaft transmits the power to the exclusive, patented vibrating element that delivers 7,000 frequencies per minute. Attachments can be furnished for SURFACING, GRINDING, SAWING, DRILLING, SANDING and PUMPING. Seven other gasoline powered and electric models ranging from 1 H.P. to 3 H.P., including 1½ H.P. universal motor type and 3 H.P. geared head unit are available to meet your requirements.




*** LOW-PRICED ELECTRIC MALL Saw**

These powerful, fast and efficient saws will save you time, labor, money and material on any construction job. You can square concrete form boards to size and pass them to workmen in a trench as fast as you can nail them in place or build complete forms on a bench ready to be placed in position; thus, eliminating hand sawing in close quarters. They are also adaptable for cutting metal, stone, slate and sawing with abrasive wheels. Each model is balanced for safe one-hand use with greatest weight on long end of board and equipped with quadrant for bevel cuts to 45 degrees, loop handle with built-in switch and safety guard.

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**We make over 200 gasoline engines, air and electrically operated tools and attachments.

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Up Canada Way**



* Six Novo Diaphragm Pumps worked 16 hours a day for 72 continuous days! Used on the new Toronto Post Office. Redfern Construction Co., Ltd., Toronto, contractors.

The pumps were Novo, 3", lift-and-force type; each had 24 feet of suction hose and handled water ranging in volume from 3000 GPH down to just seepage and air. They were sold through Geo. W. Crothers, Ltd., Toronto, Novo Distributors.

These pumps, having no close clearances to clog, handle dirty and sand-laden water without damage.

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Contractors and Engineers Monthly

All excavation in the borrow area for Sepulveda Dam in California is done by a Caterpillar elevating grader loading to Euclid Trac-Trucks. Below, a Koehring 2½-yard dragline is handling channel excavation. See page 1.



Below, one of the 2-yard concrete buckets pouring concrete for the spillway at Sepulveda. This project is part of \$70,000,000 U.S.E.D. flood-control program in Los Angeles and Orange Counties, California. See page 1.

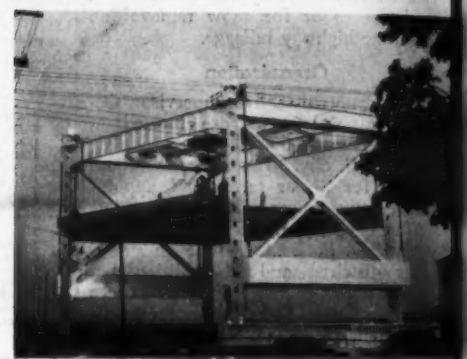


Connecticut State Highway Dept. Photo

Breaking through a rock ledge to lay subgrade drainage pipe where rock acted as a dam to pool ground water and create frost boils on Connecticut Route 2. See page 17.



A crop of U. S. Steel bearing piles, some driven on a batter, which furnish support for the spillway at Sepulveda Dam. The subcontract for pile driving was let to the Tavares Construction Co. of Los Angeles. See page 1.



C. & E. M. Photo

A side view of the lift span going up on a new bridge over Raccoon Creek in southern New Jersey, which F. A. Canuso & Son was contractor. See page 1.

Proper planning of a batching plant has a marked effect on hauling costs. A layout which permits driving through from one batcher to the next, without backing or maneuvering and therefore without lost time, is seen at the right, while—



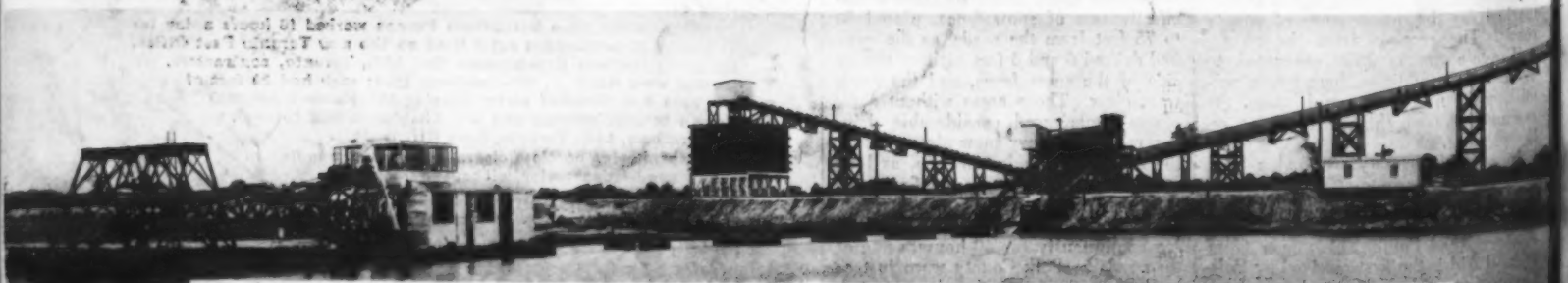
Today more than ever before, there is need for good low-cost roads in all parts of the world. This need is being met in many places by treating dirt roads with calcium chloride. At the right is a section of highway so treated on the outskirts of Algeria.



the batcher at the left is poorly located, requiring that trucks back in for their loads. In addition the depressed roadway is likely to be a handicap in bad weather. All such delays increase hauling costs and cut into job profits. See page 9.



In contrast to smooth calcium-chloride treated road above adjoining untreated section of the same road in Algeria, North Africa, though we don't travel to Africa the washboard Many of our own are equally in need of improvement.



The sand and gravel plant, including a hydraulic dredge and complete washing and screening plant, used by Shelby County, Tennessee, to supply all the aggregate needs for its highway work. Designed and equipped by the Link-Belt Co., this plant produces 750 cubic yards of washed and screened sand and gravel in 10 hours. See page 2.